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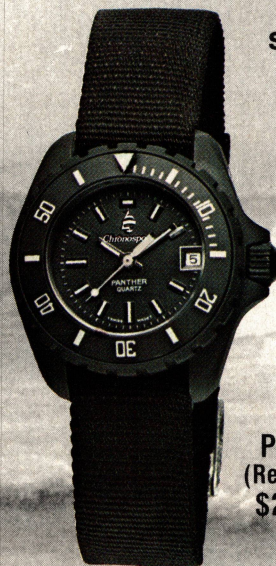
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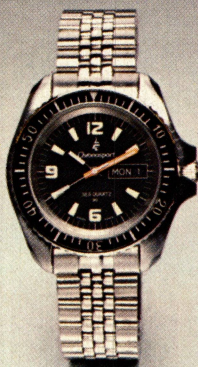
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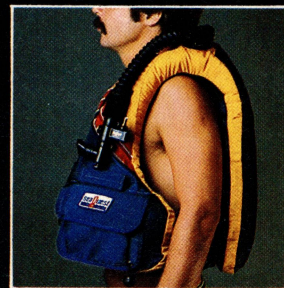
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skin diver

Volume Thirty-One Number One

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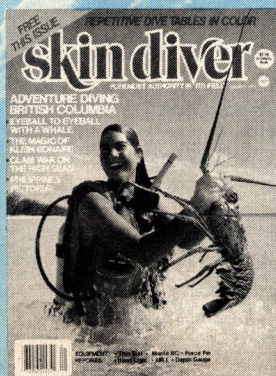
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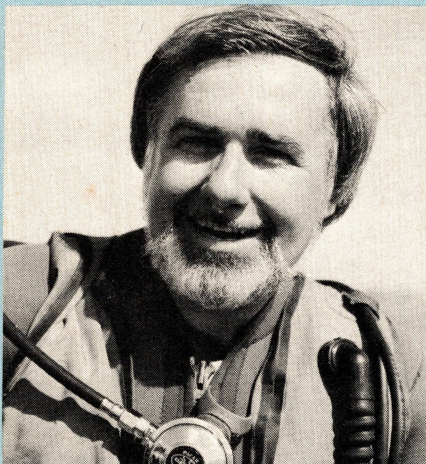
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COVER

Ohio diver, Shari Kurgis, hefts her prize catch — an eight pound spiny lobster (*Panulirus argus*). Spiny lobsters are the most sought after underwater game in the tropical waters of Florida and among the islands of the Caribbean. This animal can grow to lengths of over two feet and weights of over 30 pounds but as a result of heavy fishing, such large specimens are rare. Larger lobsters live on deeper reefs among the rocks and holes and under large sponges. Photo/Geri Murphy



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SDM Editorial

BY THE PUBLISHER

CHASE THE CHILL FACTOR WITH EXERCISE

Winter has arrived, bringing with it the traditional office parties and family gatherings. In some parts of the country, January also brings bone-chilling winds, and snow and ice on the local ponds.

For many divers, the beginning of winter means stowing away scuba gear until spring. Diving loses it appeal when the temperature drops and the wind blows fiercely. Unfortunately, the human body cannot be stored away as easily as a tank or regulator. Inactivity is the diver's worst enemy, as muscles used for swimming and the circulatory system soon begin to deteriorate if not exercised.

Aside from outdoor sports, Americans are basically a sedentary society. We drive to the corner store instead of walking — we take the elevator in lieu of climbing the stairs — and we spend many hours in front of the television watching sporting events instead of participating. Meanwhile, our body functions dwindle to minimal activity status. Our lungs rarely expand to more than half their total capacity, and our hearts beat at slightly above idling speed. Muscles that were once firm and tough begin to turn to jelly. After one month of this kind of inactivity, most of the diver's physical fitness will have faded substantially. Two months away from the water will turn even a super diver into a blob.

A program of regular exercise is essential to maintaining fitness for diving. There is a potential danger in losing diving fitness over the long winter months. The seasonal enthusiast faces a crucial period in the spring as he attempts to get back into diving. He no longer has the advantage of the preliminary training and conditioning which preceded his first open water check-out. Now he is trying to make a comeback with one quick step from the sofa to the open sea. Although the spirit may be willing, the body may not.

Thinking about diving or talking about diving does not help to regain the stamina or scuba proficiency of last season.

It is dangerous to attempt to rationalize the situation by thinking, "I won't get into a jam because I know my limitations." Out-of-shape divers have no idea of their limitations, since they have not been near the water for months. Physical fitness limitations can only be calculated by working in the water under actual diving stress situations.

The best way to avoid the pain of reconditioning your body is by not permitting it to get out of shape in the first place. Maintaining a minimum degree of scuba fitness is a far easier alternative to beginning the long hard struggle back from months of inactivity. How can you stay fit for diving? The diver has three different options available depending on where he/she lives, how much time is available, and what contacts he/she has with other divers.

Perhaps the best way of remaining fit for diving is to continue diving throughout the winter. If you can make a couple of dive trips each month, you'll find it much easier going in the spring. Obviously, this is not possible in all parts of the country, but it is certainly an option available to those who live in California or Florida. You might consider taking a couple of short dive vacations or trips during the winter months, as this provides an excellent opportunity to exercise under more pleasurable environmental conditions. A quick trip to the Caribbean or Hawaii can result in six to ten dives in a surprisingly short period of time.

Those divers who live in northern parts of the U.S., where winter is more severe, may not find it as easy to get out for an open water dive. Strong winds and frequent storms make it virtually impossible to plan weekend dive trips. However, a good alternative is to seek some form of activity at an indoor swimming pool. The most obvious is to swim laps at the local pool, making regular visits three times a week. For minimal scuba fitness maintenance, a quarter to half-mile swim is recommended. And to help things along, this swim should be done using fins, mask, and snorkel. Some

divers even wear six pounds of lead weight to make the swim more vigorous.

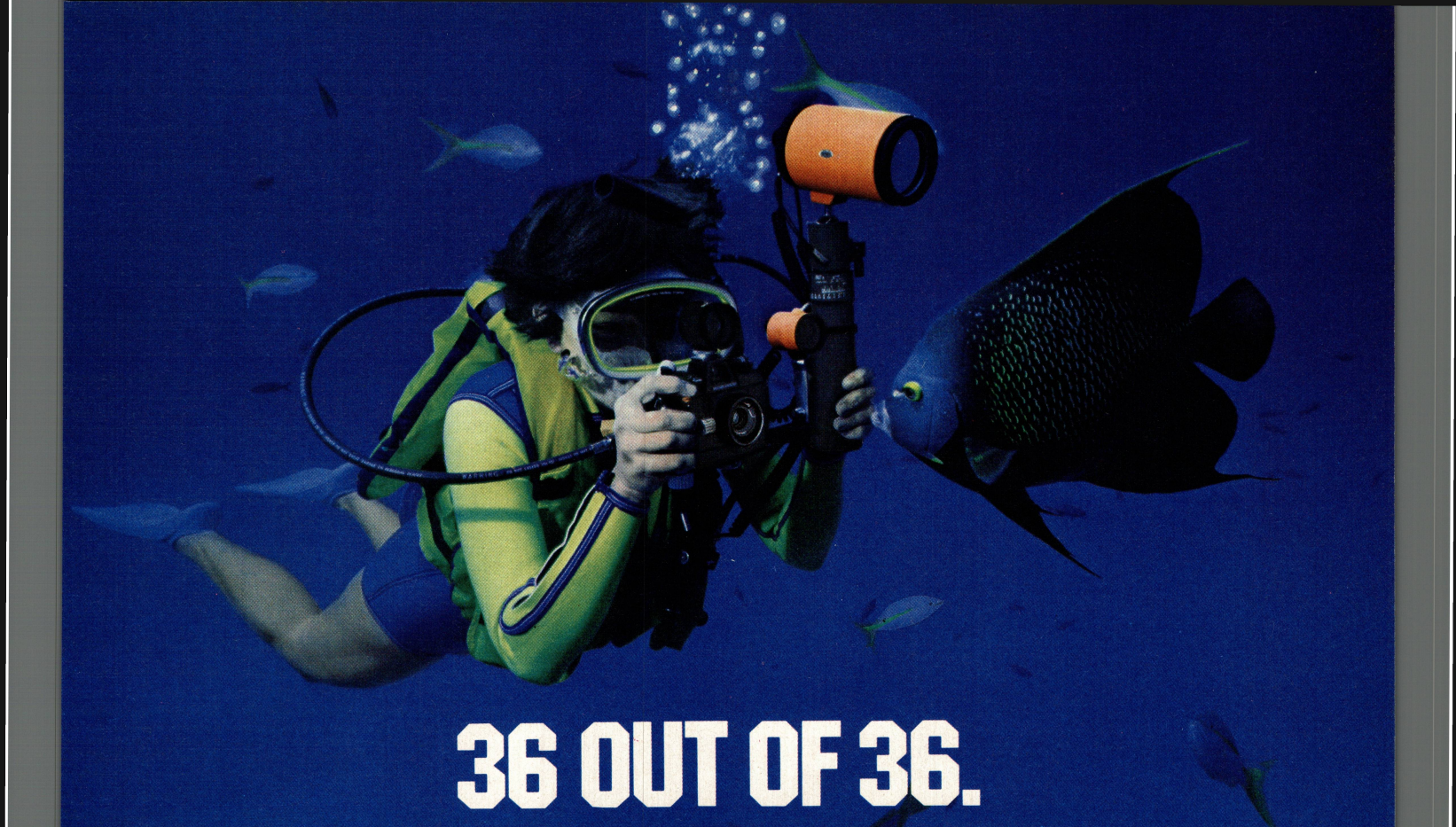
Many YMCA's have for years conducted a fitness program called, "Swim for Life." Each swimmer keeps track of the distance he/she swims in an exercise session by marking it in on a large chart. The goal of this program is to swim 50 or 100 miles over a six-month period. The same rules could be utilized for a "Scuba for Life" program.

If you find that swimming laps is a bit too boring and you seek a more challenging program of exercise, you might want to contact dive clubs or dive shops in your area to see if they are conducting any programs of regular pool competition. There is a new wave of enthusiasm which has recently begun to build for a variety of different pool games divers can play. In some parts of the country, a game called underwater rugby has gained considerable popularity and several dive shops in upstate New York are now formulating teams.

Underwater hockey has gained tremendous popularity in the Midwest and may someday become as great an activity here in the U.S. as it is in Europe. In many parts of the country, water polo has been a long-time favorite among dive clubs. Although this game is not played underwater, the strenuous exercise and competitive spirit involved certainly provide enough exercise.

Another pool competition which is extremely popular in Europe is swim fin races. As yet this activity has not reached the U.S. dive scene, but there are strong indications it may soon. The special yard-long fins used in these races are now available here.

Whatever activity you choose, it is important to stick with it throughout the winter and exercise regularly. Don't kid yourself by thinking that jogging, tennis, or snow skiing are adequate substitutes for diving. The only good exercise for swimming and diving is one which is actually done in the water — and the best way to stay fit for diving is to dive regularly. 



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Diver's Calendar

January 10-16 The Temple University Underwater Medicine Program, Grand Cayman. Category I course on underwater medicine, physiology and marine toxicology. (Contact: the Office of Continuing Medical Education, Temple University School of Medicine, 3400 North Broad St., Philadelphia, PA 19140)

January 16-February 7 YMCA scuba lifesaving and accident management, assistant instructor, instructor and cross-over courses (weekends at James Madison Univ., Harrisonburg, VA). (Contact: Ken McCracken, Land/Sea Passages, 14 E. Water St., Harrisonburg, VA 22801; phone (703) 433-2177)

January 23-26 1982 Diving Equipment Manufacturers Association (DEMA) trade show, San Antonio Convention Center, San Antonio, Texas. (Contact: Bob Gray, DEMA, P.O. Box 217, Tustin, CA 92680)

January 30 Great Lakes films. St. John's School for the Deaf auditorium, Milwaukee, WI. Featuring John Steele. Sponsored by the Buccaneer Scuba Club. (Contact: John Herrenbruck, 3016 East Armour Ave., St. Francis, WI 53207; (414) 482-1652)

February 6-13 Medicine of Sport Scuba Diving course, Flamingo Beach Hotel, Bonaire, NA. Emphasis on medical preparedness for diving emergencies. (Contact: Medical Seminars, Inc., 11406 Whisper Moss, San Antonio, TX 78230; (512) 492-5656)

February 13 Sea State '82 symposium, Portland State University, Portland, Oregon. Sponsored by the Tide Riders Scuba Club. Tickets \$6 in advance and \$7 at the door. (Contact: Sea State '82, P.O. Box 774, Tualatin, OR 97062)

February 27 Sixth Annual Divers Showcase, Lansing City Center. Artifacts, equipment, slides, dinner and film fest. Senior citizens free. (Contact: Capitol City Dive Club, P.O. Box 1055, East Lansing, MI 48823)

February 27-March 7 A diving medicine course at the Flamingo Beach Hotel, Bonaire, NA. Emphasis on identification of marine animals that inflict wounds. (Contact: Dive-Med International, The Gruhn Bldg., 3001 S. Hanover St., Baltimore, MD 21225; (301) 355-1903)

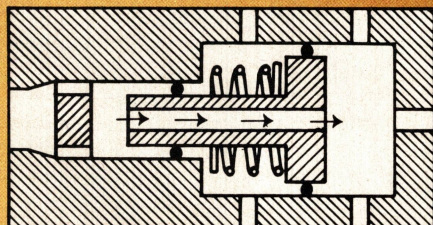
March 11-14 Underwater Canada '82, at the Constellation Hotel, Toronto. (Contact: The Ontario Underwater Council, 160 Vanderhoof Avenue, Toronto, Ontario M4G 4B8; (416) 424-6911)

March 12-14 Twenty-eighth Annual Boston Sea Rovers U/W Clinic. Lectures, seminars and underwater films. (Contact: Glen Reem, 30 Rockville Ave., Lexington, MA 02173)

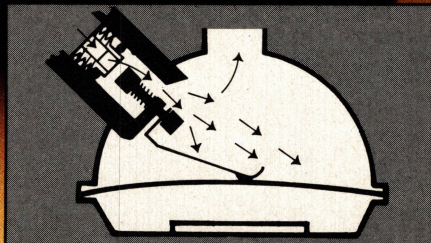
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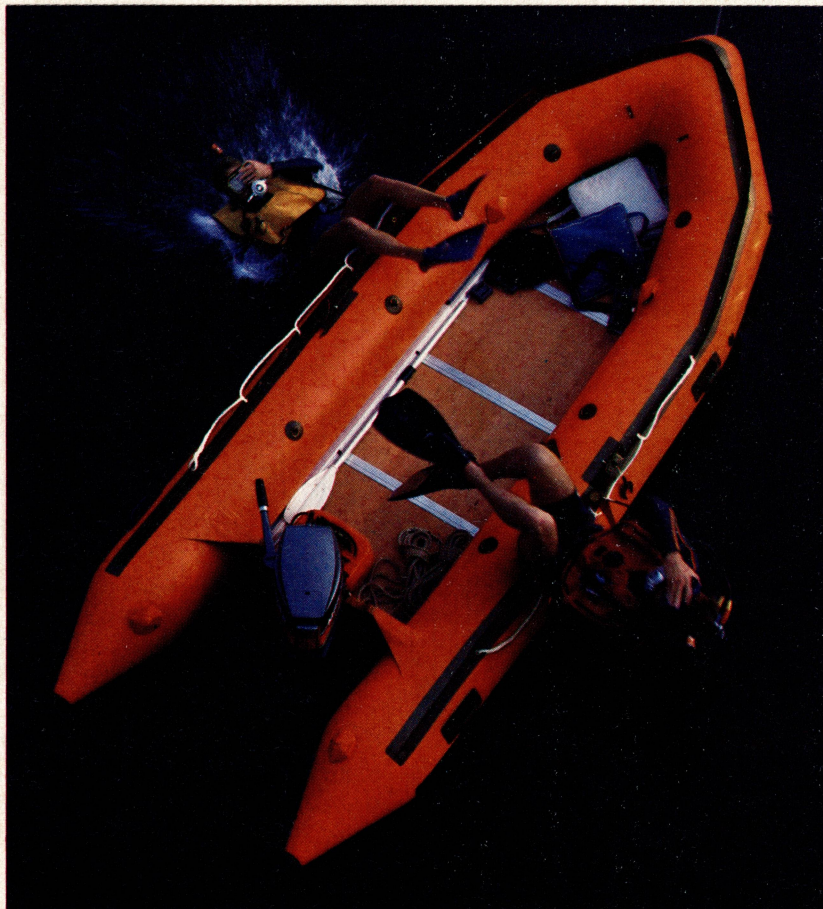
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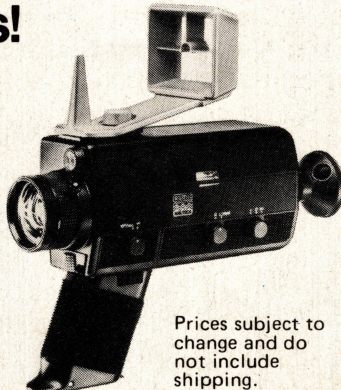
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photo/Jan Weeks

a quality stock at a significant price saving to the consumer. Twenty-four different underwater scenes are currently available, as well as a 1982 calendar.

For further information please contact Images, Images . . . Inc., P.O. Box 23818, Fort Lauderdale, FL 33334 or Stephen Frink, P.O. Box 1907, Key Largo, FL 33037.

YMCA AWARDS PROGRAM

The National YMCA U/W Activities Program will be recognizing significant contributions to the advancement of diver training and life saving with three awards. Joe Strykowski, national chairman of the U/W Activities Program, has appointed Dr. Bruce P. Strauss chairman of the selection committee for the awards.

The first award is a fellowship in the Bernard E. Empleton Society. Named after the well known writer, administrator, humanitarian and pioneer in dive education, the award is open to YMCA certified instructors.

The second program is the Kenneth C. Gillette, Jr. Memorial Life Saving Award. This is designed to recognize an outstanding act of heroism in saving or attempting to save the life of a fellow diver or anyone in danger in the water. All divers throughout the world are eligible. Membership in the YMCA or being a YMCA certified diver is not a prerequisite.

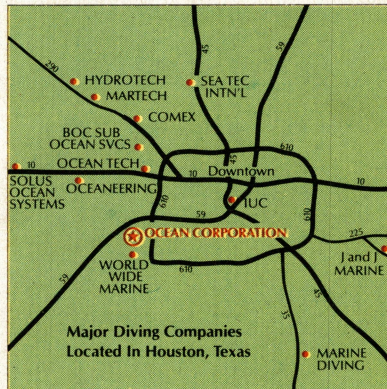
The third award is the International Diver of the Year Trophy, sponsored by the Confederation Mondiale des Activités Subaquatiques (CMAS) — The World Underwater Federation, Paris, France. This is awarded annually to that person who, in the opinion of the CMAS jury, contributed most to sport diving during the preceeding year.

Requests for further information or nomination forms should be addressed to: Dr. Bruce P. Strauss, P.O. Box 235, Newton, MA 02160-0235; phone (617) 890-4242 (days), (617) 969-5855 (evenings).

Why Houston?

BECAUSE

The Ocean Corporation is located in Houston and more commercial divers are hired in Houston than in any other place in the world. Twelve diving companies are located in Houston including three of the four largest in the U.S. Many others are located in the nearby New Orleans area. The demand for divers is so great in Houston that large locally based diving companies like Ocean Systems, Hydrotech Systems, Martech International and Sea Tech International have hired many of our students for part-time work while they were attending school. Over 90% of our recent graduates went to work for these and other local diving companies when they completed our program. Houston is the place where the action is...the commercial diving, offshore construction and oil industry capital of the world.



BECAUSE

The Ocean Corporation is a commercial diving company, not just a school. Our facilities, equipment and training aids are the best, and our diving systems are as up-to-date as possible... because much of the equipment is used by our diving operations division to perform actual diving contracts in the field. Ocean Corporation has successfully completed many underwater jobs for various industrial clients over the years... including specialized underwater inspections, maintenance and repair work. For example, we did the world's first commercial underwater repair job in a nuclear power plant. And most of our divers have been graduates of our own school.

BECAUSE

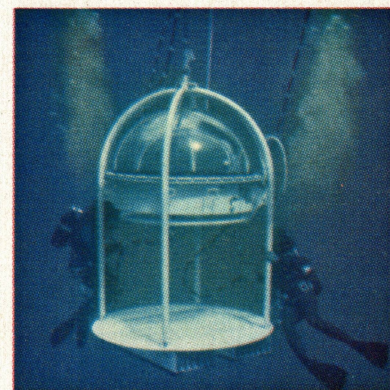
The Ocean Corporation is a convenient and exciting place to go to school. Houston is one of the fastest-growing and most dynamic cities anywhere. It is a city of expansion, energy and youth (the average resident's age is in the mid-20's). Houston offers every conceivable kind of entertainment, from sports events, ultra-modern discos and open-air theater to rough-house local rodeos, chili cook-offs and the new Texas-size



country-western dance clubs. Reasonably priced adult and singles apartments are readily available within walking distance of the school, and fast-food to luxury restaurants are nearby. The semi-tropical climate is wonderful, the sport diving is great and the folks are friendly.

BECAUSE

The Ocean Corporation management and instructor staff have long-term experience in the international offshore oilfield diving business. Retired ex-military divers and sport scuba divers don't run the school...commercial divers do. For example, the President of The Ocean Corporation, Larry



Cushman, was Vice President and Europe/Africa Area Manager for Ocean Systems, Inc. for three years...with responsibility for all North Sea diving and underwater construction operations. He also worked six years as a manager for Oceaneering International, Inc., another of the world's largest commercial diving contractors. Ocean Corporation managers and instructors know today's diving business...first-hand, from recent experience.



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Whale Chase

*Stalking the Gray Whale
is a wait and watch proposition*

By Marty Snyderman



The job description sounded so simple. Howard Hall and I were to film gray whales in the beautiful waters of San Ignacio Lagoon, Baja California. We would be working for Franz Lazi, a noted West German filmmaker. I had pictured myself in those beautiful waters filming the most cooperative of whales. In my mind's eye the footage was exceptional. As the story unfolded in my head the certainty took root that this material would keep me on the film festival circuit for years to come.

In the lagoon, however, things just didn't go as planned. The first few days neither of us even had the opportunity to get

in the water with whales. We simply baked, as opposed to basked, in the Baja sun. Then we suffered the frustration of whales that came close enough to get us into the water but not close enough to film.

Another encounter went something like this. We were approached by a "friendly" gray whale that swam without hesitation toward our boat. There was a collision that sent cameras and bodies flying like leaves in a storm. The 80,000 pound animal apparently liked the contact — it backed up to bump us again and again.

All this while Howard and I conversed. "Howard, now is your



photos/Marty Snyderman



photo/Julia Whitty-Jones

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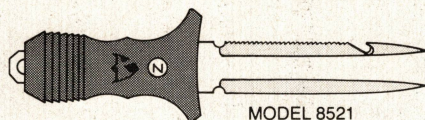
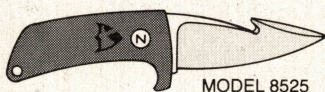
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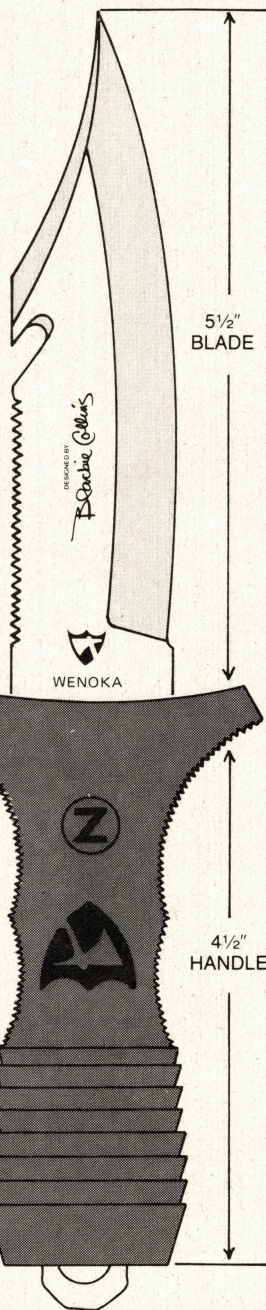
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WHALE CHASE

chance. Get in and I'll hand you your camera."

"Sorry, Marty, I can't find my mask. Why don't you film this one?"

At this point we were interrupted by the whale which knocked our outboard into the inflatable. We decided to pray. We replaced the motor and tried to film the animal by holding the camera over the side, but the whale suddenly departed. On the way back to the mother ship we tried to make our knees stop shaking as we discussed interesting topics such as alternative careers and the legalities of breaking contracts.

A little frustrated and a lot wiser about our task we continued on. The next day I again found myself bobbing on the surface, awaiting an approaching pair of whales. This time there was a cow and her calf. The baby was close to 15 feet long and weighed more than two tons. The cinematographer in me wanted to swim toward the whales but the rest of me wasn't so sure. Previous mistakes had taught us that approaching the whales was not the thing to do. In the difficult diving conditions of the lagoon, it was best to let the mammals come to us. The twosome was only 50 yards away when they dropped below the choppy surface, the calf rolling down the mother's back as they submerged. The whales seemed to be heading right for me, but I had thought that before. Then I heard Howard excitedly directing me from the boat. "Look to your right, Marty, to your right!" With camera running, I turned and there before me was the face of a gray whale. I had just realized it was the calf when into view came the head of the cow. Unbeliev-



photo/Marty Snyderman

able! For years I had wanted a good opportunity to film one gray whale and now there were two. In an instant, all of our previous efforts and frustrations became worthwhile. Although I felt no sense of impending danger, I was immediately overwhelmed by their size. The calf appeared small next to its mother, but it was enormous next to me. The mother's pectoral flipper looked to be as long as I am tall and with 15 foot visibility I could only see about one-third of the adult. I can never remember feeling so small.

For most of the next 30 minutes I was

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WHALE CHASE

able to swim with and film these whales. It was one half hour of pure diving pleasure. Initially the calf appeared to be more curious, or at least less cautious, than the cow. It boldly approached me, on several occasions coming to within inches of my camera. After a few minutes the cow seemed to become more relaxed as she, too, came closer and closer.

I was free diving in an effort to be as quick as possible, and in the restricted visibility both whales repeatedly faded out of sight. I must admit my knees became rather weak when they were beneath me. The thought of getting "a lift" from a rising gray whale sent crazy thoughts careening around in my head. Once the cow exhaled from directly below me and the stream of bubbles knocked me for a loop. That's right, the whale sent me head over heels just by breathing on me. I heard Howard laughing at me from the safety of the boat but somehow I just didn't see the humor.

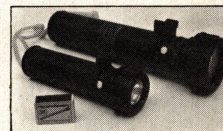
Fortunately, neither animal surfaced from directly beneath me, both seemed acutely aware of my exact location. Their movements were incredibly precise and their body control excellent. I vividly recall watching them gently touching each other. They rolled against one another, rubbing their faces together. Then they would spin completely around for several revolutions. Using their pectoral flippers to control the spins and their powerful flukes to push themselves forward through the water, both animals maneuvered with remarkable ease. The surrounding water remained relatively undisturbed despite the presence of two playful whales. Calm, that is, until the cow decided to use her fluke to swim forward in a sudden burst of speed. The backwash alone from the ten foot wide fluke was enough to dislodge my mask. Bubbles went swirling toward the bottom as far as I could see and in an instant she was gone. The mother reappeared in a few moments to repeat the procedure. Several times she brought her fluke within inches of my head, but she never touched me.

I, however, could not resist the temptation and did reach out to touch my new found diving companions. Their skin was rubbery to the touch and though I cannot be certain, I had the distinct impression that they were quite sensitive to the contact of my fingers. The mother had patches of barnacles and whale lice all over her body but the skin of the calf was relatively free of these pests. It is the combination of the white barnacle patches and the natural black skin that gives these whales their overall mottled gray color and, hence, their name.

(Continued on Page 24)



The creative underwater lightsystems



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Halogenbulbs, 180/45/
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Recharger 110/220 V,
or Solarcharger.

UW-Minispot

5/20 Watt Halogenbulbs,
80/20 minutes duration.
Recharger 110/220 V,
or Solarcharger.

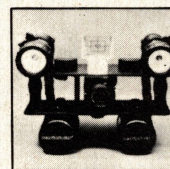
UW-Cine Light 230

spiralcord lamp with
Ni-cd accu 2,3 Ah,
12 cells, 100 Watt
Halogenbulbs, 15 mi-
nutes duration.
Recharger 110/220 V
or Solarcharger.



UW-Cine Light 400

spiralcord lamp with Ni-cd accu 4 Ah, 12 cells,
100 Watt Halogenbulbs, 26 minutes duration.
Recharger 110/220 V, or Solarcharger.

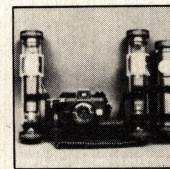
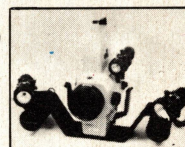


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the Magnificent Melibe

Everyone tends to have favorite subjects in the field of underwater photography. This is usually owing to the beautiful color, or unusual appearance of the animal or because they are abundant. Nudibranchs are very popular with photographers since they fit into all three areas. Articles about diving in cold, West Coast waters often feature these beautiful animals.

Although I have nothing against nudibranchs (they are my favorite subject, too), my complaint is that of the 100 or more nudibranchs found off the West Coast, only a few vibrantly colored ones are pictured. What about the other, less photogenic species?

If you look closely at a kelp blade you may find a half dozen of these drab creatures such as the *Melibe leonina*.

Found in the top 12 inches of a kelp bed, *Melibe* has no common name. It is a weird-looking creature, like something out of *Star Wars*! The *Melibe* is a master of disguise and unless someone showed you one, you probably would never see it. There are literally thousands in kelp beds from Canada to Mexico, and yet even the most experienced divers are unaware of their existence.

The *Melibe* can grow to five inches in length and assumes the color of the kelp

Text and
Photography
by Jack and Sue Drafa

blade while remaining somewhat translucent. If you look at a kelp blade from the top, the *Melibe* is invisible. If you look from the edge, you will see a small blob of jelly. As you move the blade, the *Melibe* will unfold the wing-like gills on its back, called cerata, which are used to take in oxygen. These are shaped like kelp blades and help disguise it.

The *Melibe* feeds on crustacean larvae and its method of capturing these organisms is unique. When in quiet waters, the *Melibe* opens a giant hood fringed with a double row of tentacles and extends this forward, much as a South Sea islander casts a throw net. After each "throw" the edges are brought together, forming a

screen that retains the prey in its mouth as the water is forced out. When the animal is feeding in a current, it simply extends this feeding "basket" and twists back and forth catching its food.

The *Melibe* also has the ability to move in open water. If this strange creature is knocked loose from its home on the kelp blade, it will start undulating from side-to-side. It cannot control its direction, however, and must go wherever the current takes it.

Plan to search for *Melibes* on your next trip. But, when you reach the dive site and see dozens of other divers scouring the kelp beds, you can safely assume they read this article before you did! 

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REPET DIVE TABLES

A Simplified Approach to Repetitive Dive Computation

By Bonnie J. Cardone

Today's divers are making more dives per day than ever before. In order to avoid the bends or risky decompression, every diver must be adept at computing bottom times and surface intervals. And, a set of repetitive dive tables is just as necessary as your SPG, your watch and your right arm.

Over the years, the Navy Repetitive Dive Tables have been modified and various approaches have been tried to make them easier to use and understand. The tables reproduced on these pages are brought to you courtesy of PADI. Newly revised, they were just released in November of 1981. They are color coded and show depths in both feet and meters. Part of the Navy Standard Air Decompression Table has been incorporated into the Repetitive Group Designation Table so that if bottom time or depth is exceeded, the diver will know how long to decompress at ten feet. In addition, no decompression bottom time limits have been computed for each depth. Thus, on repetitive dives, you need only decide how deep you are going to dive, then look at the chart to see how long you can stay down without making a decompression stop. Should you exceed that time or depth, the tables will tell you how long to decompress.

The PADI Tables actually consist of three tables, not one. Tables 1 and 2 are on one side; Table 3 on the reverse side.

Table 1: No Decompression Limits and Group Designation. The no de-

compression limits for each depth (in feet and meters) down to 140 feet appear in black squares: Enter the chart at the top and read down. If decompression is required for that depth and time, the square will be half white and half yellow. Total bottom time appears in the white half; decompression stop time, at ten feet, is shown in the yellow half. When depth and time have been determined, read to the right and enter the next table.

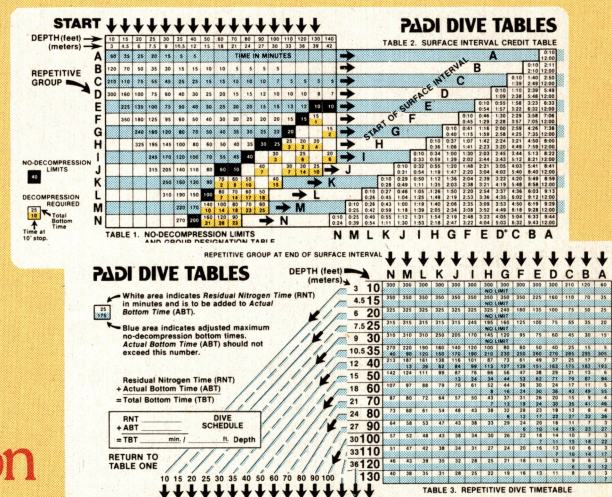
Table 2: Surface Interval Credit. When you surface, you will have a group designation letter determined by depth and time. The A group has the least bottom time; N has the most. Missing from the PADI tables but found on the Navy tables are letters O and Z: These are not groups that any sport diver should ever find himself/herself in. Surface interval is the total hours: minutes a diver spends topside between dives. This is important because surface intervals allow nitrogen to out-gas from the tissues: The longer you are topside the less nitrogen you have in your system. After 12 hours all the excess nitrogen is considered to have left the tissues and you start all over again. Enter Table 2 from Table 1 horizontally and continue horizontally until you reach the total hours: minutes spent topside. Follow that column down to the bottom of the chart to determine your new group designation letter. Flip the chart over to enter Table 3.

Table 3: Repetitive Dive Timetable. This tells you what your Residual Nitrogen Time (RNT) is, in minutes, for each depth.

RNT, when added to Actual Bottom Time (ABT) equals Total Bottom Time. This tells you how much time you may spend on your next dive at a particular depth without decompressing. The squares on Table 3 are half blue and half white: RNT appears in the white half; adjusted maximum no decompression bottom time is shown in the blue half. As long as Actual Bottom Time does not exceed the number of minutes shown in the blue half, decompression is not required. Thus, at a glance, it is easy to see how much time you may spend at any depth. Enter this table at the top, according to your group designation letter, and read down to the depth, in feet or meters, that you intend to dive. Then, read off the table to the left and follow the arrows: Flip the chart over to return to Table 1 for your next dive.

The PADI Tables are reproduced slightly less than life size on the next page. You can obtain a sturdy, plasticized version, with a hole punched in one side, from your PADI Training Facility or PADI Headquarters (1243 E. Warner Ave., Santa Ana, CA 92705) for \$5.95 each. A wall chart for instructors to use when teaching the tables is available for \$8.50.

The repetitive dive tables should accompany each and every diver on each and every dive. They can be carried in your BC pocket or attached to your belt. Eliminate guesswork and last minute hassles by having a set of repetitive dive tables with you during the entire dive.



22 SKIN DIVER JANUARY 1982

TABLE 2. SURFACE INTERVAL CREDIT TABLE

TABLE 1. NO-DECOMPRESSION LIMITS
AND GROUP DESIGNATION TABLE

^k If flying up to 8,000 feet after diving, wait for the surface interval required to attain Group D.

CONTINUE ON OTHER SIDE

TABLE 3. REPETITIVE DIVE TIMETABLE

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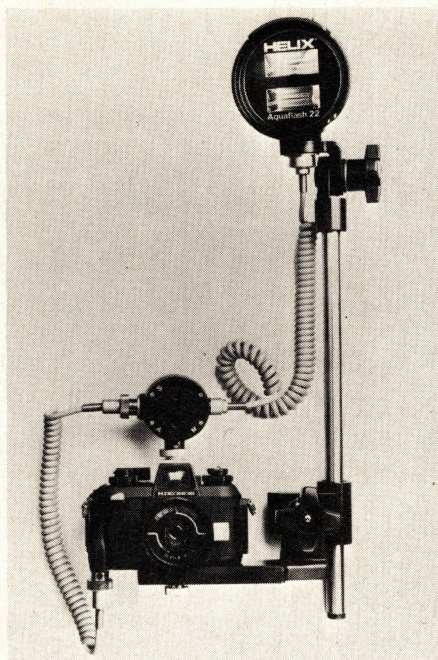
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WHALE CHASE

(Continued from Page 17)

As time passed I became more and more confident. I was able to swim right up to the baseball-sized eye of the calf for a tight shot but had to pay the price of having the calf return the favor. It proceeded to bounce me on its nose four times. I laugh about it now but in the water I wasn't quite sure how much of that I wanted to do.

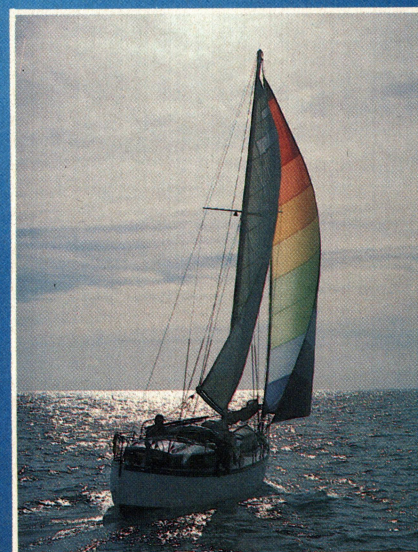
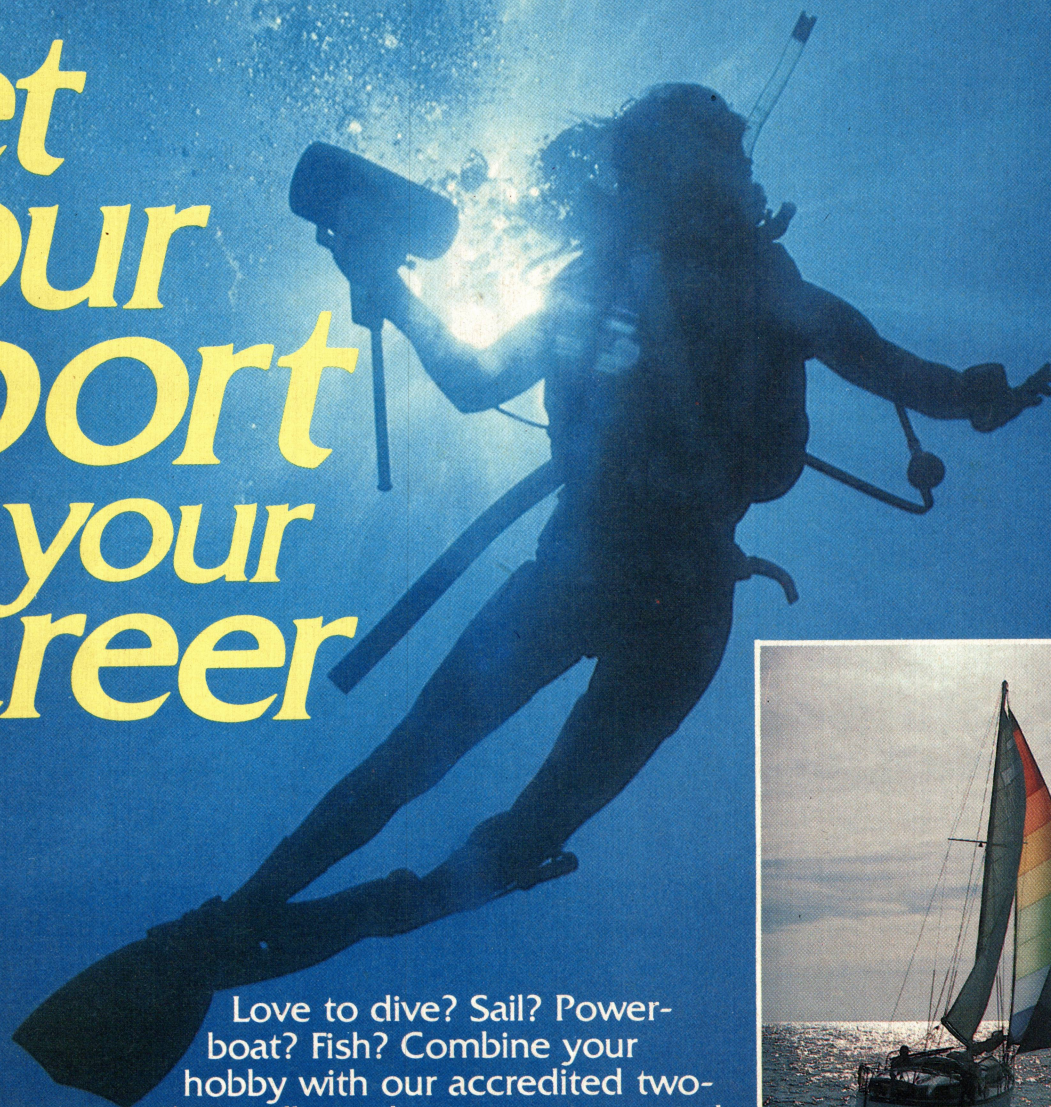
When I ran out of film I asked Howard to hand me his camera. With a smile that said, "Don't hold your breath pal," he slid over the side of the inflatable into the water. Thinking, "Fair is fair," I exited to help give him directions from the boat. In the water it was rather easy to lose sight of the whales due to prevailing water conditions. A buddy giving directions from the boat was like adding 50 feet to the visibility, so we worked with one of us in the water and one in the boat. As Howard ran low on film, the whales, for no apparent reason, decided to leave and that was the end of a most memorable diving experience.

None of the diving or filming would have been possible without the Mexican government which granted us a special documentary permit to dive and film in the lagoon sanctuaries. And none of it would have been possible without some exceptional luck in weather and water conditions. Visibility in the lagoon is often well under ten feet, tidal currents up to eight knots are the rule rather than the exception and winds often gust to 50 knots.

We were lucky, too, in that the whales chose this day to be so cooperative. In previous encounters we have not always been so fortunate. Once, Howard and I made the mistake of diving directly in front of a gray whale. I never saw the animal underwater as visibility was less than ten feet, but Howard did. By his account, "The whale looked startled, then tense and it bolted away. I knew I was in trouble before I saw the fluke coming at me." The fluke smashed Howard's left arm and broke two ribs. Witnesses on the boat said the whale seemed to throw its fluke at Howard in an exaggerated motion as if it were trying to hit him, and experts say whales throw their flukes at predators to ward them off. And, last year a whale pushed an inflatable on top of Howard's head, breaking his mask, but luckily he was not hurt.

Looking back on all those experiences I have had with gray whales, I realize that those dives were some of the best of my diving and photographic career. It is demanding and, in some ways, dangerous work, but the rewards are well worth the price that must be paid. The real treasure is the magic moments shared in the wilderness of Baja with a creature as magnificent as the gray whale. 🐋

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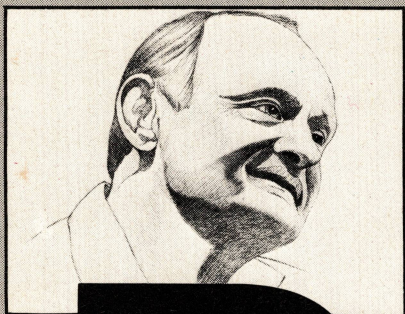
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to be a commercial diving medical technician. There are at least three. We previously spoke of one offered by Commercial Diving Center, 272 S. Fries Ave., Wilmington, CA 90744. Charles Vallance has announced that Florida Institute of Technology offers a similar Emergency Medical Technician/Diver course as an integral part of its two year program in underwater technology. For information write FIT, 1707 N.E. Indian River Dr., Jensen Beach, FL 33457. The Ocean Corporation also trains Diver Medical Technicians. For information on that course write: The Ocean Corporation, 5709 Glenmont, Houston, TX 77081.

Question: In the water, as in the casinos, somebody's always trying to beat the

stead of ascending directly, stop and play around at 40 feet until your air is depleted — say another 20 minutes. Although technically this violates the no decompression limit, the tables imply that it's safe. Here's why: a 90/30 dive puts you into repetitive group H. An H diver arriving at 40 feet has a residual nitrogen time of 87 minutes. Add the 20 minutes you spend there and you get 107 minutes — far short of the 200 minute no decompression limit for 40 feet.

Answer: Your reasoning is sound and exposes a logical inconsistency in the tables. It arises because the rules governing their use, adopted to avoid complexity as well as provide safety, make you pretend that the 20 minutes spent at 40

RX FOR DIVERS

BY CHARLES V. BROWN, M.D.

DIVING MEDICS

Many readers have asked whether there are courses that prepare one

system. Jared Sharman of Jackson Heights, NY came up with this beaut for extending bottom time. Say you've been at 90 feet for the legal 30 minutes. In-

feet was really spent at 90 feet. In other words, you're to treat the dive as 90/50, which puts you into a decompression situation. Yet the tables do permit a 90/30



That can't be Jack...

*I didn't even think
he knew how to swim!*

*Looks like he knows
more than we thought...*

dive followed by an 11 minute surface interval (to avoid the rule of adding bottom times) and a 40/20 repetitive dive.

We believe the dive profile you suggest, while technically illegal, is safer than a 90/30 dive with or without a 40/20 repetitive dive. Recall that during a dive some tissues take up nitrogen quickly and others slowly. After 30 minutes at 90 feet, nitrogen tension in the fast tissues will be close to that in inhaled air. Surfacing directly will create a high supersaturation in those tissues and they'll probably bubble. A repetitive dive will shrink but not eliminate the bubbles (they're surprisingly stable), and they'll grow even more during the second ascent. If you halt your initial ascent at 40 feet, bubbles will be less likely to form, and any that do will be much smaller.

You can think of it as a decompression stop. By 20 minutes, most of the supersaturated nitrogen in the fast tissues will diffuse out the lungs, and the rest (ignoring bubbles) into slow tissues that remain unsaturated even for the 40 foot level. Surfacing then will create less supersaturation and less tendency to bubble than in the other cases.

Although the foregoing describes our opinion, we cannot recommend departing from standard practice until such time as it's officially authorized, e.g., by the Navy.

Question: Max Sjostedt of Australia wants to pack in his fire brigade job for a

dive tour business in Bali. That's the dream. The nightmare is his doctor's warning of deafness, vertigo and maybe even drowning if he dives. Trouble is, Max had an operation (stapedectomy) for otosclerosis. It restored his hearing but didn't stop the ringing noises. That was two years ago and he's made six trouble free dives since, but the doctor's dire warning has him worried.

Answer: With otosclerosis (Latin for ear hardening) the ossicle chain in the middle ear gradually loses ability to transmit sound vibrations. Usually the stapes is most involved, and installing a plastic or wire replacement improves hearing. Ringing noise reflects inner ear damage, which is not correctable.

Many doctors tell their stapedectomy patients not to dive, because they don't know whether it's safe. One concern is that the artificial installation may not hold up as well as the natural ossicle chain under squeeze stress. Another is that any dive related inner ear injury may summate with pre-existing otosclerosis damage to cause a significant disability (deafness, loud ringing, dizziness).

The extent of the risk is not known. We've heard from several people who did resume diving after stapedectomy, and so far none has reported any difficulty. A logical precaution is to descend only when the ears clear very easily.

Protest: A lady in Maine has taken umbrage at the appellation "boobs" ap-

plied, in a previous column, to the female breast.

Reply: Neither offense nor sexism was intended. Our mail indicates that the majority of women readers do not seem to take offense at such mild attempts at jocularity to relieve humdrum didactics.

Question: Just as some panic at the underwater world, so do others at the prospect of losing it. A diver who in ordinary life works in a hospital learned that a patient he'd tended had tuberculosis. The boss said not to worry, as the exposure wasn't all that great. But worry he does. Can he dive pending tests to prove he's clean? And what if he's not?

Answer: Tuberculosis isn't a nice disease, but fortunately it's not highly contagious. Unless you've lived in intimate association with the patient, you're not likely to get it. As long as you're free of symptoms, go ahead and dive pending the test results. If only the skin test comes up positive, it's possible that you have an old, arrested case and can dive safely. If the skin test converts from negative to positive, or if other tests suggest active tuberculosis, don't dive till you're cured.

Question: Instructor Martha Kiser of Baltimore has two prospective students who take medicine for high blood pressure. Both are in good shape and eager.

Answer: Uncomplicated controlled hypertension needn't hold them back, but the drugs they take to control it just

(Continued on Page 56)

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The Philippines in a pictorial sea

Text and Photography by Lynn Funkhouser and Paul Schutt

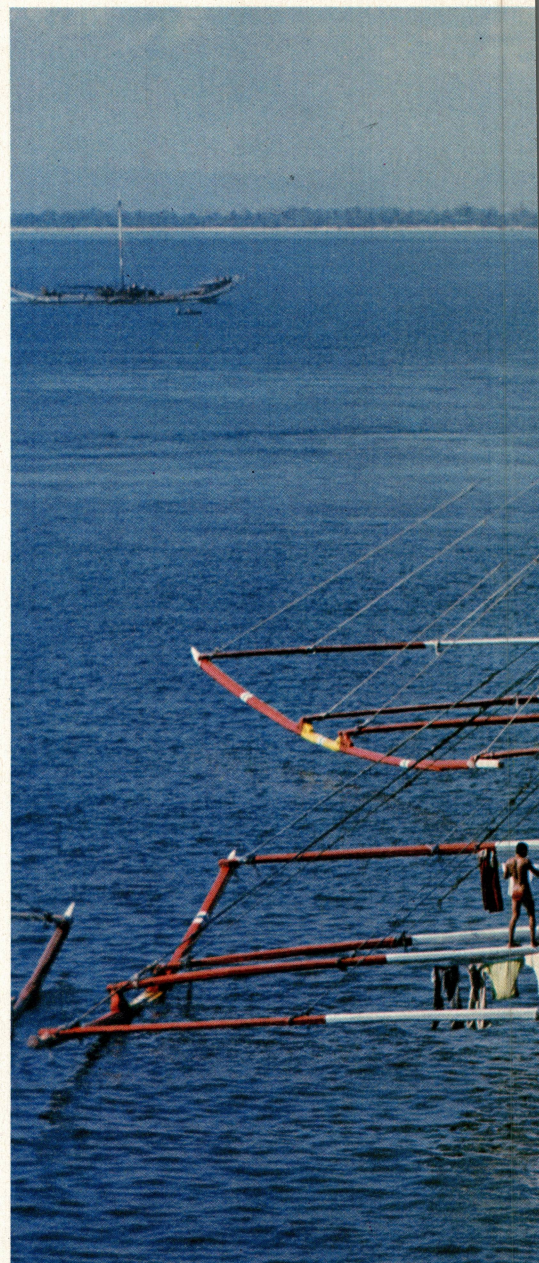
The Philippines are composed of 7118 islands. You could dive a different island every day and it would still be 20 years before you saw all of them. And, if you made only a single dive on each island you would have missed a great deal.

No matter what your main interest when touring the underwater world, you will find it in the Philippines. There is so much life competing for your attention that you have to remind yourself that there are walls, caves and crevices to explore before you let yourself spend an entire dive in a 10 foot square area.

For the shell collector, the Philippines are unequalled anywhere. This is where such prizes as the golden and spotted cowries, glory of the sea cone and thousands of other species of shells are found. If you aren't lucky enough to find your own, there are many shops which specialize in shells and beautiful handicrafts. You can also barter for shells with the natives on many islands. A package of American cigarettes can work wonders when bargaining.

For fish watchers, there are approximately 20 species of angelfish, 30 species of butterflyfish, 12 species of clownfish and two species of flashlight fish, as well as numerous tangs, parrots, groupers, wrasses, sweetlips, batfish, pipefish, lionfish, goldfish and many, many more. This is the country that supplies most of the exotic (and expensive) fish prized by aquarists.

For the diver who likes exotic invertebrate critters, the Philippines are utopia. You can see nudibranchs on every dive. Crinoids come in every color combination imaginable and don't hide during the day. Some of the crabs are ingenious. One hermit species farms anemones on its back feeding them when food is plentiful and eating them when food is scarce. The tiny *Lybia* (or pom pom) crab carries anemones on its claws

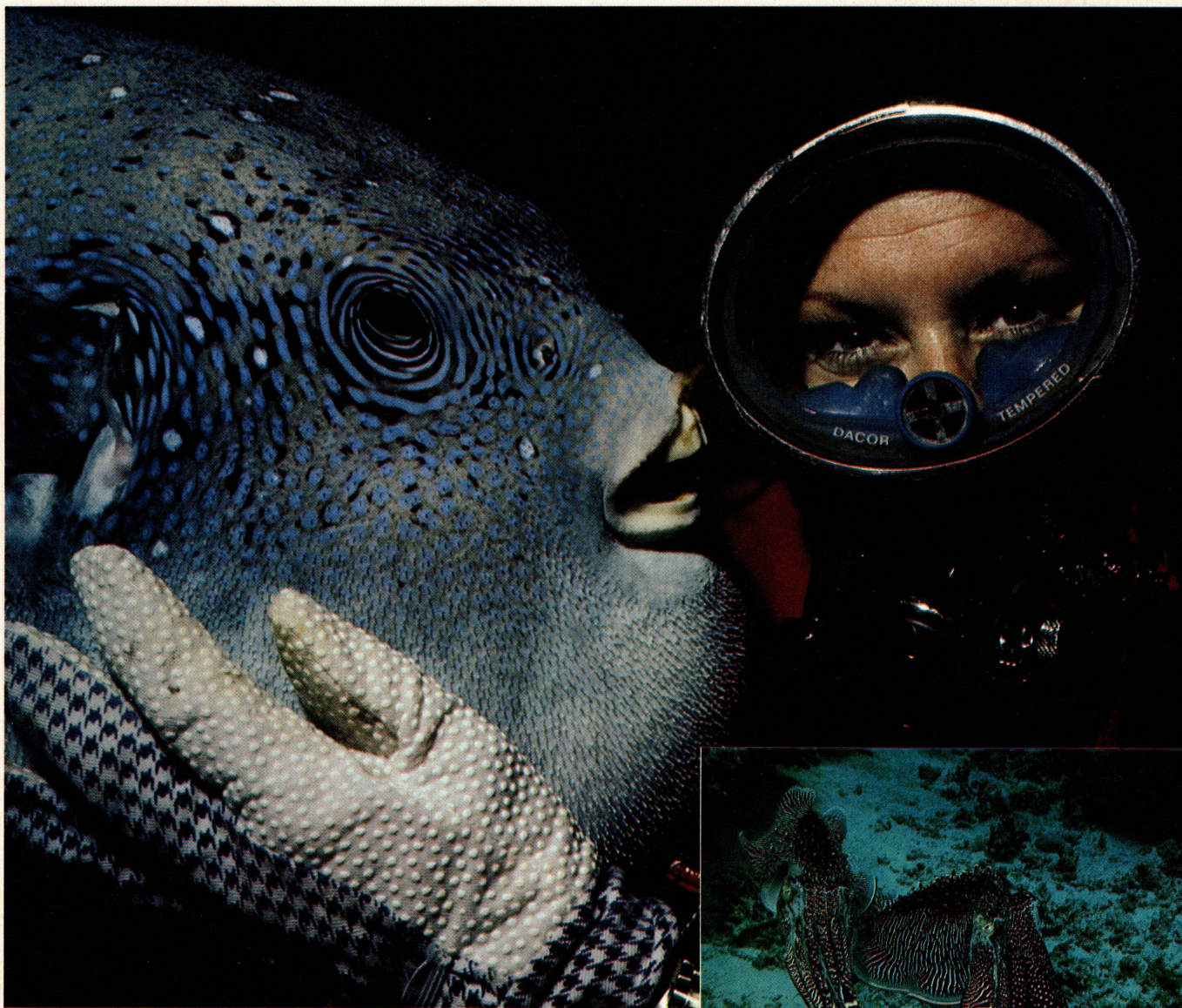




photo/Paul Schutt



Upper, commercial bancas (boats) off the city of Zamboanga. Lower, left to right: The shell fishermen of Cebu bait nets and leave them on the bottom overnight. Many rare gastropods are captured when they become entangled in the nets. The masks protect the fishermen from unwanted suntans. A diver pauses behind red coral seafans. These seafans are used to make semi-precious jewelry. The colorful and unusual ribbon eel is also called the snorkel-nosed moray. An anemone crab rests on a carpet anemone. Although this anemone is partially closed, the clownfish that make it their home remain nearby; ready to nestle in the protective tentacles.



for defense. There are beautiful tube and colonial anemones and, anemones larger than old wagon wheels are homes to clownfish and many species of shrimp and crabs. The lobsters are almost too pretty to eat. There are also innumerable seasquirts, flatworms, sea cucumbers and hundreds of species of hard and soft corals.

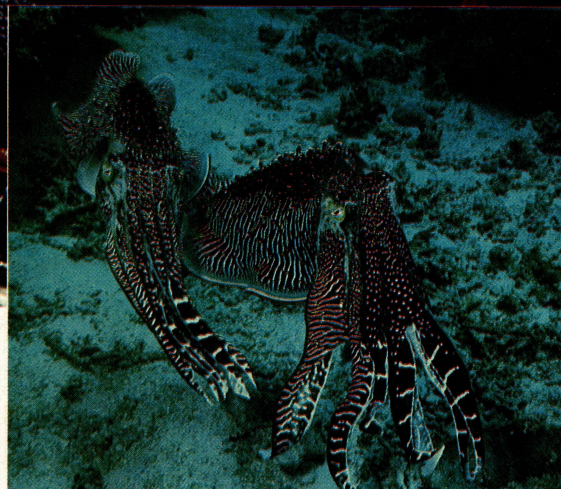
Sport diving as a business is relatively new in the Philippines so there are many places to be explored. Apo Reef, probably the best known area, has been rated as one of the 10 best dive spots in the world. There are other areas that are even more spectacular.

Last year we chartered two boats and traveled 110 miles into the Sulu Sea to dive the islands of Cuyo, Calusa, Cavili and the reefs of Tubbataha. It was really awesome to know that we were the first divers ever to see some of these areas.

Cebu is another popular area. Many rare shells are found here. You can stay in Cebu City or at Tambuli resort and dive Mactan Island. There is a resort being built on Cabilao Island which should be in operation soon. That is another excellent area to dive.

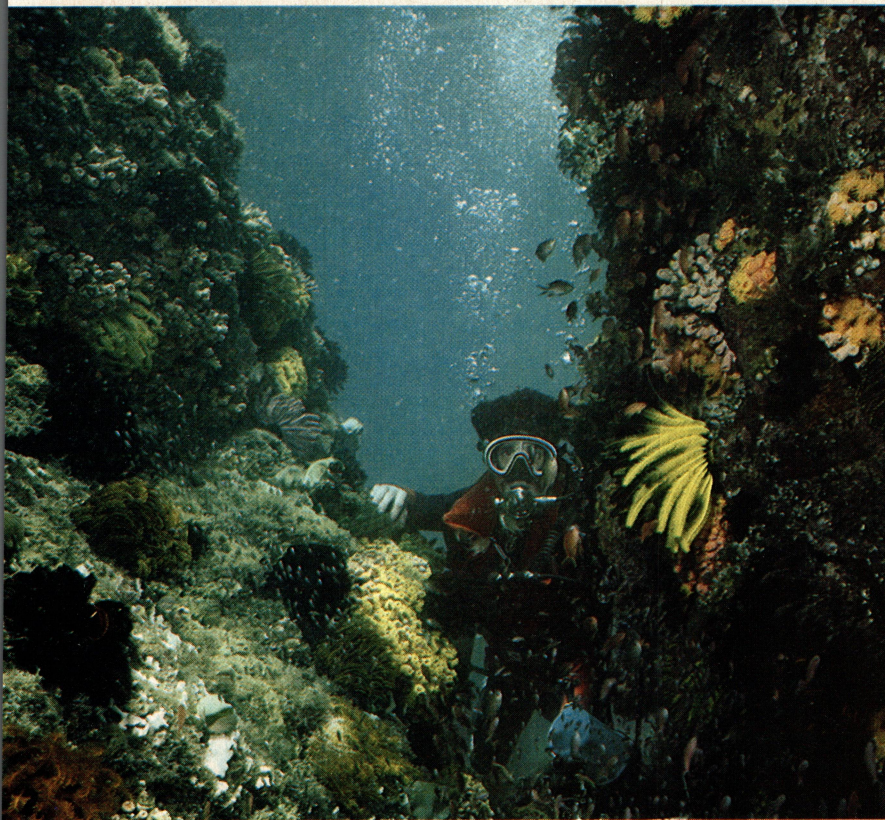
Batangas Province, approximately a two hour drive from Manila, is still one of our favorite areas and certainly the most easily accessible. There are many resorts there. You can dive from the beach — the drop-offs and walls are quite close to shore — or rent a banca (boat) and guide for approximately \$20 U.S. per day.

In addition to the spectacular diving, the Filipino people are most hospitable, friendly and helpful (they love Americans and that is a real treat); the food is fantastic and once you get there, living is relatively inexpensive. The Philippines should certainly be considered in your diving vacation plans. 🐠

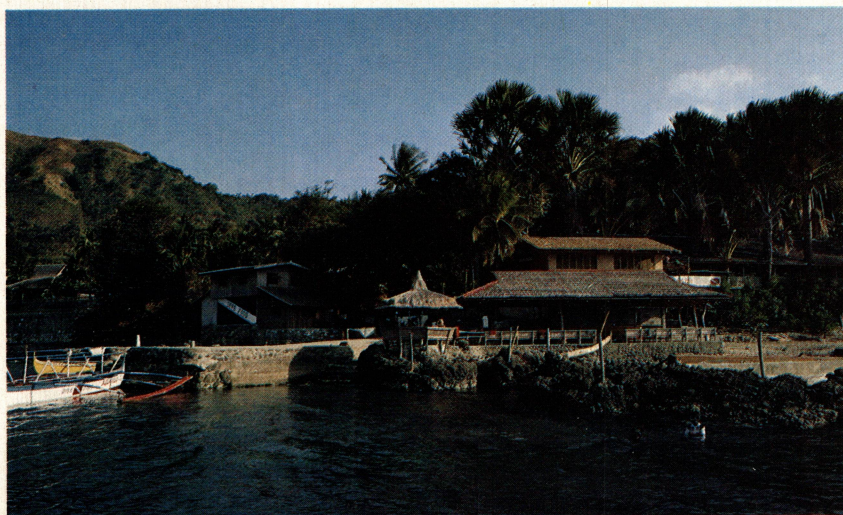


Top, while on a night dive, a diver caresses a huge, slumbering puffer. Above, without harming each other, two male cuttlefish contest for dominance. In some unknown way the winner is chosen and he mates with the female. Below, a banca cruises homeward at sunset.



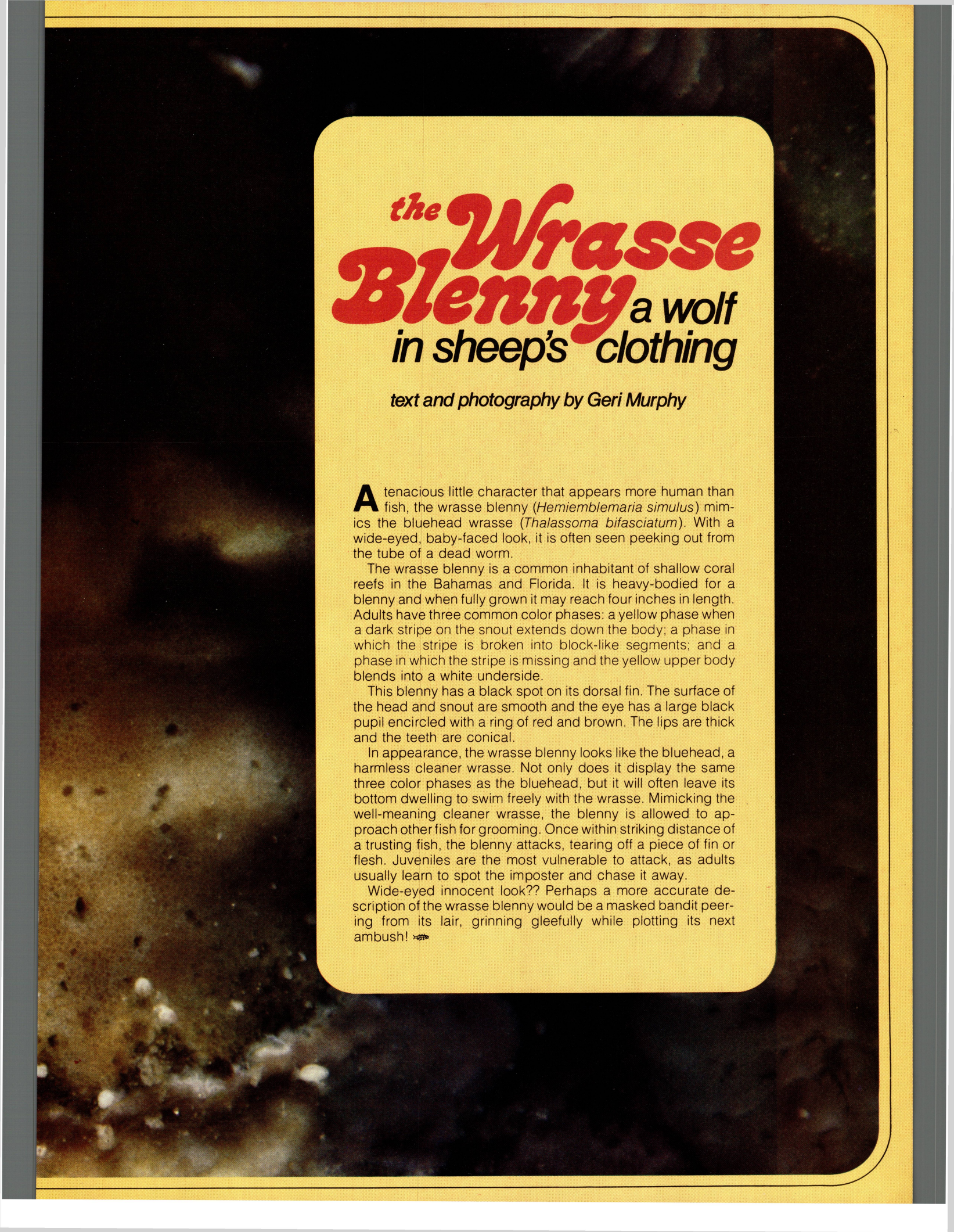


Above, pertinent geographical locations. Left, Charles Seaborn marvels at the abundance of colorful crinoids in only 25 feet of water at Twin Rocks, Batangas.



Above left, a baby cuttlefish displays a multitude of marvelous colors. Above, a typical Filipino dinner of snow peas, quail eggs, crabs and barbecued pork appetizers. Left, the Dive 7000 resort, owned by Tim Sevilla, near the village of Anilo in Batangas Province — two hours by car and 20 minutes by banca from Manila.





the **Wrasse** **Blenny** *a wolf* *in sheep's clothing*

text and photography by Geri Murphy

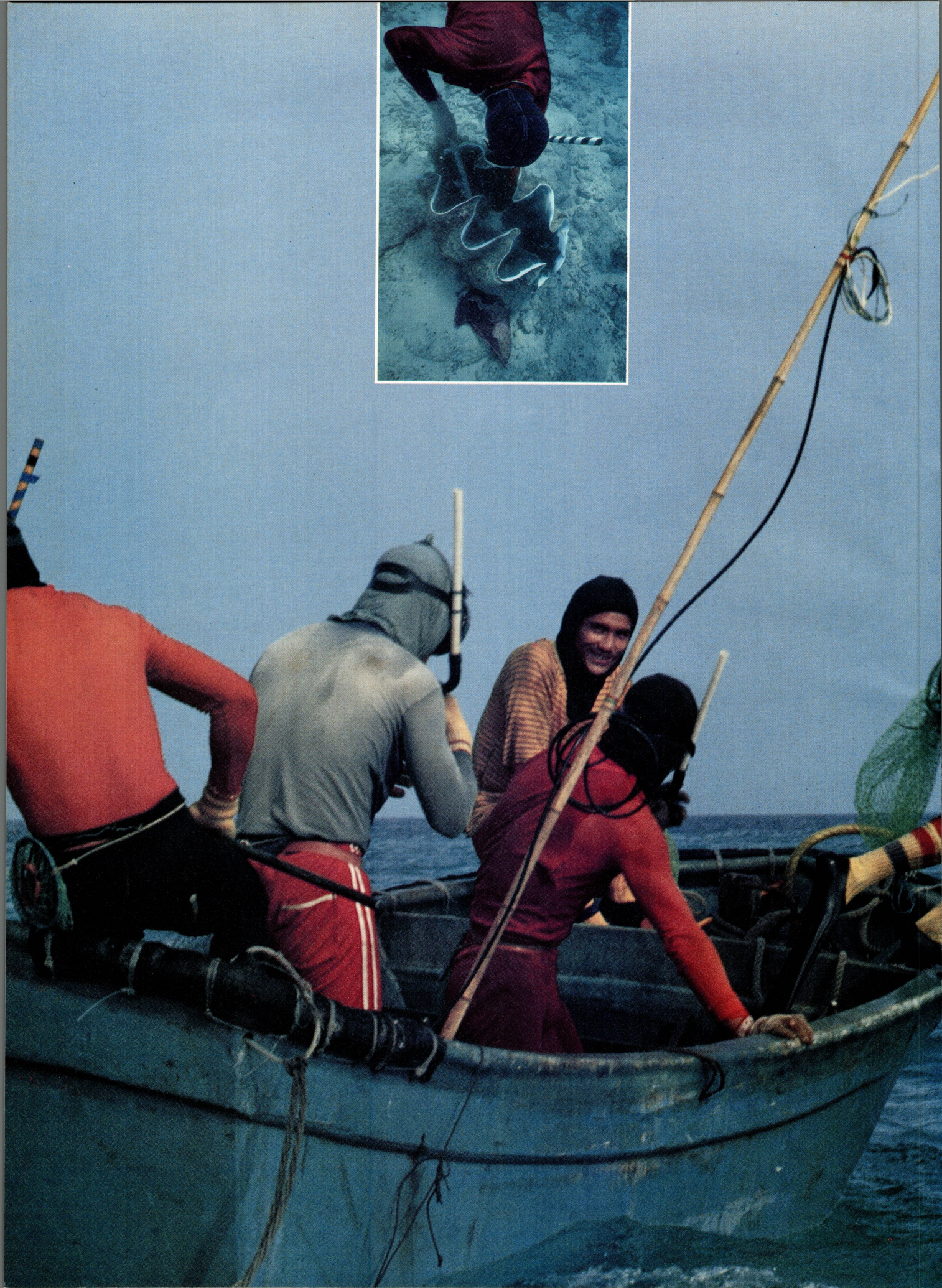
A tenacious little character that appears more human than fish, the wrasse blenny (*Hemimblemaria simulus*) mimics the bluehead wrasse (*Thalassoma bifasciatum*). With a wide-eyed, baby-faced look, it is often seen peeking out from the tube of a dead worm.

The wrasse blenny is a common inhabitant of shallow coral reefs in the Bahamas and Florida. It is heavy-bodied for a blenny and when fully grown it may reach four inches in length. Adults have three common color phases: a yellow phase when a dark stripe on the snout extends down the body; a phase in which the stripe is broken into block-like segments; and a phase in which the stripe is missing and the yellow upper body blends into a white underside.

This blenny has a black spot on its dorsal fin. The surface of the head and snout are smooth and the eye has a large black pupil encircled with a ring of red and brown. The lips are thick and the teeth are conical.

In appearance, the wrasse blenny looks like the bluehead, a harmless cleaner wrasse. Not only does it display the same three color phases as the bluehead, but it will often leave its bottom dwelling to swim freely with the wrasse. Mimicking the well-meaning cleaner wrasse, the blenny is allowed to approach other fish for grooming. Once within striking distance of a trusting fish, the blenny attacks, tearing off a piece of fin or flesh. Juveniles are the most vulnerable to attack, as adults usually learn to spot the imposter and chase it away.

Wide-eyed innocent look?? Perhaps a more accurate description of the wrasse blenny would be a masked bandit peering from its lair, grinning gleefully while plotting its next ambush! 



Clam Poaching

ON THE HIGH SEAS

By Ben Cropp

It took just 40 seconds to destroy the giant clam that had taken over 100 years to grow. The chisel-edged tool sliced through the muscle and the tightly clamped jaws of the clam went slack. The Taiwanese diver put a hand on each side and easily pushed the jaws wide apart. Now he expertly used the tool to sever the muscle where it attached to each half of the huge clam.

His hand plunged inside the mutilated creature and tore out hunks of muscle weighing a quarter of a kilo (approximately one-half pound). As I watched this brutal dissection, it made me think of an Aztec high priest tearing out the heart of his sacrificial victim.

It was all over in seconds. The diver picked up his weapon and swam off rapidly to look for another victim. Not a moment was lost, for each diver is paid only for the number of clam muscles he brings back. Speed is essential, as six other divers competed for all the live clams within a small radius of the waiting dory.

My bulky movie camera slowed me down and I had trouble keeping up with the fast moving diver. As he swam, he deftly cut away the remaining pieces of mantle still clinging to the muscle. Then this square hunk of valuable meat was slipped into his string bag.

I swung back to look at the mutilated clam. The water was clouded green with blood and offal. The little coral fish were already inside, slowly pulling the creature apart piece by piece. By tomorrow it would be another empty white shell and, later, a brown algae covered skeleton. A magnificent 200 kilo (440 lb.) creature had been reduced to a gaping limestone shell — all for a tiny piece of muscle prized by the gourmets of Hong Kong and Japan.

On this day when the clams died, my wife Lynn and I became the first persons to film the infamous Taiwanese clam poachers in action.

The Great Barrier Reef has suffered from these clam poachers for years. I have chased and reported several of their boats and even filmed the capture of one. But, we were always behind them. They dared not stay

(Continued on Page 98)

Upper left, a clam poacher tears out chunks of muscle from a helpless bivalve. Below, the poachers weigh anchor to flee a patrol boat.



photos/Lynn Cropp

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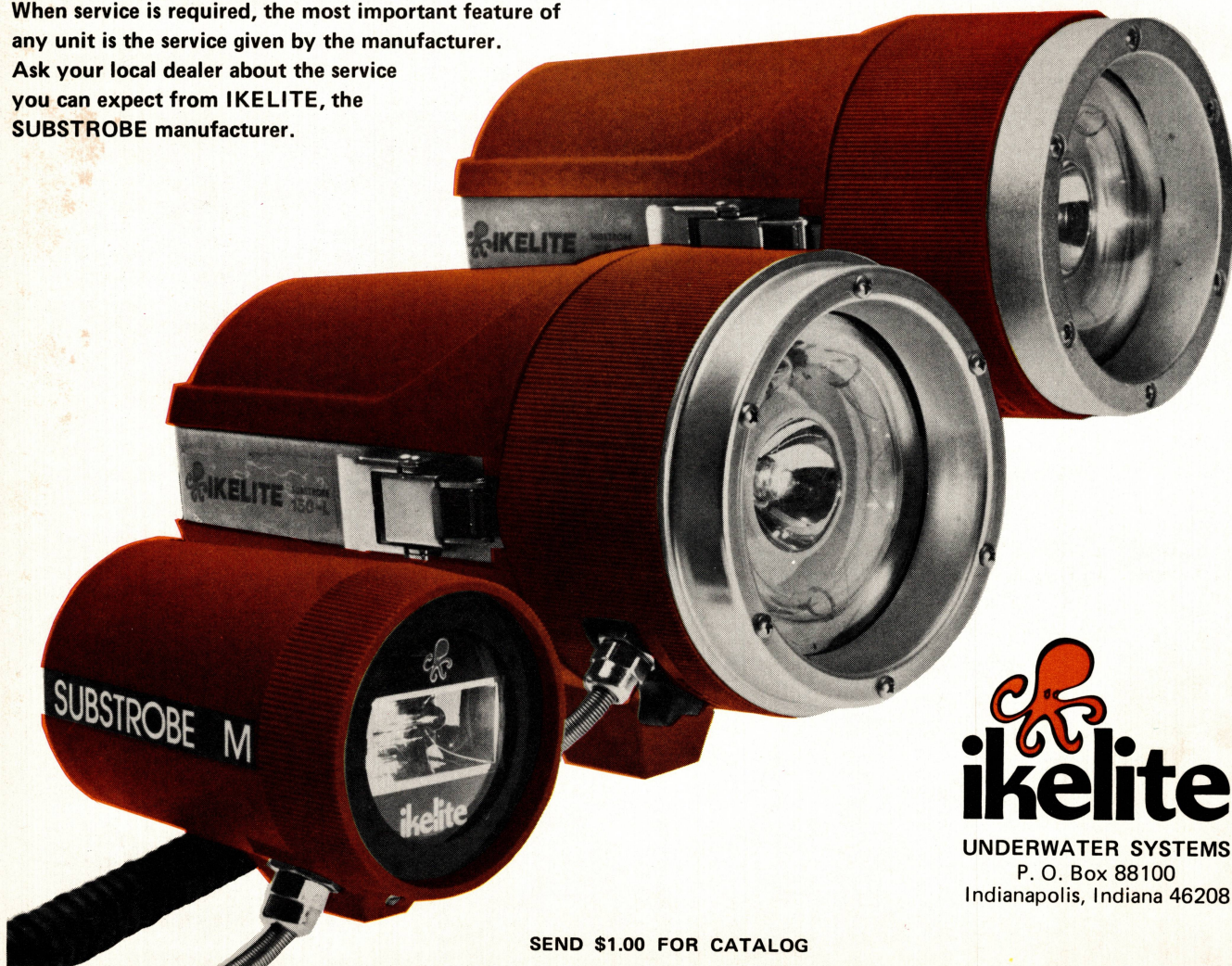
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The Standard, 24 Sept. 1906

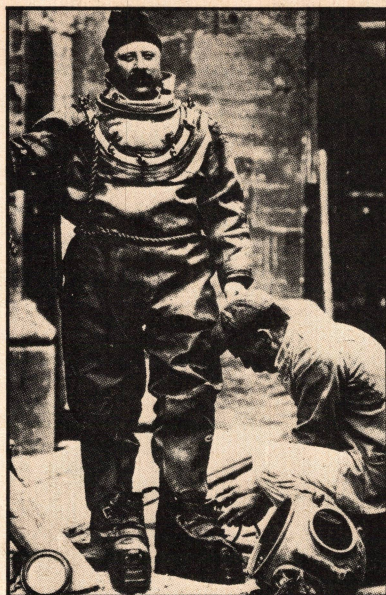
William Walker was born in London, England in 1864. At the age of 23 he began working for the Portsmouth Dockyard as a diver's attendant. As time progressed, Walker learned his trade well and worked up to the position of a diver's signalman. As dive technology then existed, diving was learned almost exclusively through on-the-job training. Soon, Walker had achieved enough experience and competence to become a fully qualified diver.

Then, in 1892, Walker joined the famous firm of Siebe Gorman and Company where he was appointed chief diver. His staff numbered more than 200 divers, who worked for the company on worldwide ventures. Soon, however, he would be chosen for the most demanding task of his career. It would shower him with praises from the people, the Archbishop of Canterbury, and the King of England!

In 1905, a report was given to the Archbishop of Canterbury at Winchester Cathedral concerning the condition of the west end, the crypt beneath the Lady Chapel and the south wall of the presbytery (which was leaning out at a dangerous degree). Immediately notified was the well known architect, T.G. Jackson, who dug a ten foot deep exploratory trench at the south wall of the retrochoir.

Upon his observations he sought the counsel of Francis Fox, a consulting engineer, and together they found the problem lay in the fact that the cavity underneath the original structure was flooded with underground water which flowed in and out with the change of the seasons. This had been going on for centuries! Obviously, restoration would be difficult.

The original Norman cathedral was built between 1087 and 1093 and was greatly expanded in the 13th century. Evidently, the 13th century builders extended their structure beyond practical limits by constructing it on a timber raft. This huge solid platform filled the gap between the actual stone foundations and the peat bed below. A section of a



THE DIVER WHO SAVED WINCHESTER CATHEDRAL

By David C. McCall

building of this magnitude is estimated to weigh about 40 tons per square foot, so it is easy to see why the retrochoir began to slowly sink almost as soon as it was built. It didn't take long before the timber rotted and was taken away by the underground currents. As this reaction started, the retrochoir began to slightly, yet literally, break away and lean out from the original cathedral, toward the east end, and the floor took on a noticeable downward slope. As further evidence at the south wall, the gable at the south transept overhangs its base by four feet.

Up to 100 men worked on correcting the superstructure between 1905 and 1912, putting in 500 tons of grouting, 16 and a half tons of tie-rods, refacing the west front, and building ten additional support buttresses. But, success could not be considered potential without underpinning the entire wing. And that was all underwater!

Enter William Walker.

Starting in 1906, Walker's first job was to build up the foundations directly under the cathedral walls where most of the building's weight was displaced. This was achieved by digging a number of narrow 10 to 20 foot long trenches down to the peat bed, in which Walker

descended, cleared away the peat and dammed the open end with unopened, porous sacks of concrete. When the saturated sacks of concrete hardened, the water was pumped from the trench and the remainder of the distance up to the base of the building was completed with concrete blocks.

Let us remember that Walker's diving suit weighed nearly 200 pounds. Each boot weighed 20 pounds, on his chest and back were weights of 40 pounds each, his helmet weighed 20 pounds, and the rubber suit itself weighed over 30 pounds. Once he was in the water, however, he was so buoyant that he had to place his feet under the ladder rungs and pull himself downward step by step.

The farther under the building Walker ventured, the more hazardous his job was. Just because the raft had held for 700 years did not mean that it wouldn't collapse now, especially under the stresses of reconstruction.

Once submerged, the diver would cautiously creep through the muck and sludge of the peat bed, farther into the deep recesses of the foundation. At times he would come upon large stone boxes and realize he was in the infectious waters of the crypt. That didn't seem to bother Walker though. He would merely surface at the day's end and light his pipe, which he claimed would keep away all ills — apparently it worked. Walking around under the cathedral was a genuine feat in itself because there were no underwater lights then. Walker worked in complete darkness, utilizing every ounce of his sensitivity and professional training.

And so, for over five years Walker worked in this way, creeping around under the major part of the foundations, underpinning them wherever necessary, always in the most conscientious manner. It is estimated that he handled 25,800 sacks of concrete, 114,900 concrete blocks and 900,000 bricks.

The original total cost estimate for the reconstruction was £3,000. When work was finally completed in 1912, it actually cost £11,300. Today, that same work would cost well over \$2,000,000. Through various programs and generous contributions, including from the King himself, the massive reworking was finally paid for on St. Swithun's Day, 1912 and a special thanksgiving service was held giving tribute to all those who contributed so much of their time, their money and their lives!

In 1964 a statue of Walker was constructed and it now stands in the cathedral just opposite a statue of St. Joan of Arc. The statue serves as a remembrance and a tribute to the diver who saved Winchester Cathedral with his own hands. 



Force Fin

**Santa Barbara Diver
Develops Radical Design**

BY HILLARY HAUSER

His company is called La Mer Bleu Productions, and while his main occupation is underwater photography, he has never stopped dreaming of the future of man in the ocean.

Now he has designed a new type of swim fin, the principle of which was inspired by his observations of aquatic animals. These fins have already created such a stir with snorkelers, body surfers and swimmers that the Los Angeles company distributing and marketing them received a barrage of mail long before the first flipper sprung from the mold.

The man is Bob Evans, and his invention is the Force Fin.

The fin approximates the action of a seal's flippers — or the undulations of a swimming fish. The reason for this is that the tips, or wings, of the fin fold down on the upkick. "I've always been amazed that a fish or a seal could swim so gracefully," Evans says, "and I realized that if the blade of a fin doesn't give, too much energy is used to get the next kick ready and the swimmer gets worn out. We could learn a thing or two from the sea animals."

Since the Force Fin folds down on the upkick, the foot of the swimmer is very nearly propelled out of the water owing to the

photo/Bob Evans

reduced resistance of water on the blade. Then, with the downkick, the fin snaps out for a burst of speed. Since there are no thick ribs on the fin, the blade is not pushed sideways or at an angle with the kick — but instead moves directly forward. The forceful forward action is so noticeable that during test swims divers found they could wear the fins without heel straps.

Divers also noticed that the swimming action of the Force Fin was radically different from other fins; in the Force Fin the blade extends from under the foot rather than from the tips of the toes, and swimming with the Force Fin at first gives the impression that there is nothing attached to the foot at all.

Evans, 31, has been thinking about fins for over 13 years and his attic contains over 25 prototypes. He began working on the final design and molds for the Force Fin in July of 1980 with the help of Jimmy Gray, another Santa Barbaran who is in charge of production at Diving Systems International (makers of the Kirby-Morgan bandmasks). The Force Fin is being patented, and the unusual wrinkle in that particular legality is that the mechanical motion of the fin is being registered along with the design. "That's a first," says Evans, "because motion has never been patented before, in fins, anyway."

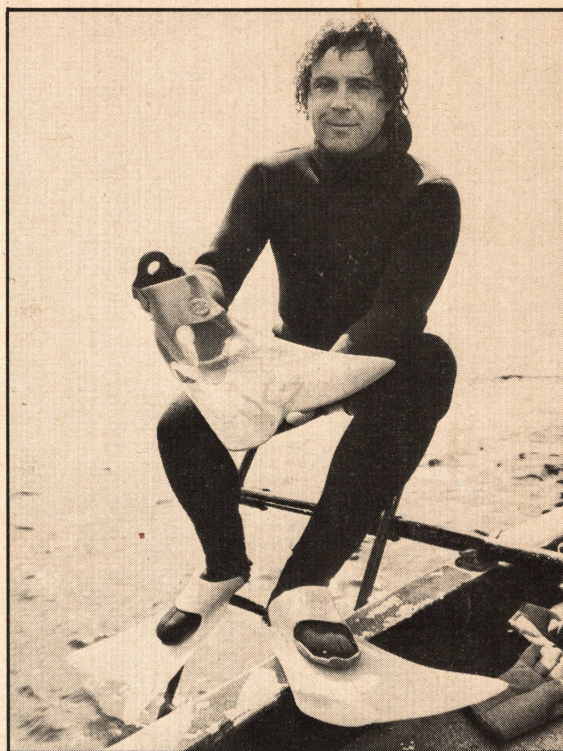
The Meistrells of Dive 'N Surf in Redondo Beach, California have financed the development of the Force Fin in Santa Barbara, and their second company, BG Watersports, will market the fin worldwide. Robbie Meistrell, who has been overseeing fin production, has conducted countless test runs for the Force Fin — body surfing with them off Redondo Beach and Santa Barbara, and diving with them in the Cayman Islands. Although the Force Fins now on the market are principally designed for body surfing and snorkeling, divers who have tried them say that they provide more than enough power for propulsion with the heavier equipment. Even so, a dive model of the Force Fin is scheduled to go into production early this year.

One of the advantages of the Force Fin, discovered during the Cayman trips, was that divers could walk, nearly run, on the boat deck while wearing the fins. Because of their compact size and design (the blades angling upward at the tips) and because of their flexibility (they are made of urethane instead of rubber) wearing the Force Fin is something akin to wearing shoes that are a bit bigger than the feet. While the Cayman boat captain forbids the wearing of other fins on his deck, he makes an exception for the Force Fins because they aren't hazardous to walk in.

But the Force Fin is not made for walking — and Evans is adamant about that. "We've been swimming backward for years," he says, "with paddle wheels on our feet rather than propellers." He points out that if the fin is held in two hands and pulled down through water, the fin will be propelled forward in the hands. "It's the snapping action of the blade," Evans explains, whipping his arm through the air to illustrate, "that gives the burst of speed." Then, once the foot is down, it's important to get the foot back up again.

The Force Fin does not rely on holes in the blade to reduce water resistance. It is a hydrodynamic principle that goes to work at this point, the flexible tips folding in to form a low-pressure area underneath the fin during the upkick — making less surface to push through the water. The blade is completely balanced.

Jimmy Gray, who was hired to do the shaping of the Force Fin, is a former surfboard manufacturer, and it is Gray who taught Evans the mechanics of mold-making. There were times, admittedly, when Evans said he felt discouraged by the seemingly insurmountable problems associated with fin production, but when the word leaked out about the fins and when divers and body surfers began to contact the Meistrells about them, his outlook brightened considerably.



photo/Miriam S. Greene



photo/Geri Murphy

Above, Bob Evans holds (and wears) his creation — the Force Fin. Below, the Force Fin is designed to approximate the undulations of a swimming fish. The fin folds down on the upkick to reduce water resistance and opens for full power on the downstroke.

That's because Bob Evans sees his fins as a means to an end. "Everyone copies everyone else," he says, "and we need new designs, new ways of looking at things. Maybe what we're trying to do here will get all of us to think about changing, hopefully for the better, in everything we do. We should at least be trying new things."

And, he goes one step further. If the Force Fin is as successful as first responses indicate it will be, Evans views the subject this way: "I'll take that money," he says, "and I'll put it into developing a plan we have at La Mer Bleu for farming mussels, or for building a floating home. We have to think of the future, and our future is the sea." 



SON of Substrobe

Ikelite introduces the Substrobe M—An inexpensive mini-strobe powered by AA batteries

Text and Photography by Geri Murphy

Shortly after the introduction of the Substrobe 150-L, Ikelite initiated a secret development project for the design of a miniature version of this highly popular submersible. Ikelite's goal was to develop a mini-strobe that could sell for under \$200 and utilize a fairly common and inexpensive battery source. Once again, Ikelite has managed to achieve its design goals: After a year of development work the company has introduced the Substrobe M.

DESIGN

As with the big daddy Substrobe 150-L, the miniature version features an exterior shell of extremely durable injection molded Cyclocac plastic. It is the type of material that can withstand corrosive sea water, coral scratches and being

tossed around on a dive boat. The Substrobe M is indeed a miniature, measuring only four and one-half inches in length and slightly more than three inches in diameter. The entire strobe head could easily fit into most BC pockets; it weighs only 1.3 pounds out of water; and is a couple of ounces positive underwater.

Perhaps the most attractive feature of the Substrobe M is its power source: four AA batteries. These are available almost everywhere from supermarkets to drug-stores to camera stores and dive stores. They are available in either standard dry cells or rechargeable ni-cads and both can be used in the Substrobe M. The ideal type of batteries for this little unit are the alkaline long-life's, such as the Eveready E91, the Duracell MN1500, the

Ray-O-Vac 815 or Radio Shack 23-552.

Although the Substrobe M is primarily designed for use in close-up and macro photography, it will work quite well at medium distances underwater. The rectangular flashtube reflector produces a lighting pattern 70 degrees wide by 50 degrees vertical, for a combined coverage of 65 degrees diagonal. The little strobe will fully cover the picture field of either the Nikonos 35 mm or 28 mm lenses. The dome port on the strobe front ensures full and even coverage. Color temperature for the Substrobe M is approximately 5800° Kelvin.

CONSTRUCTION

An exterior examination of the Substrobe M reveals that just about all the component parts are made of non-corro-

sive plastics. The only metal part that we could find was the anodized aluminum screw that holds the battery compartment door in place. Incidentally, the battery compartment door itself is sealed by an O-ring gasket. The strobe's on/off switch is also plastic and features a positive click stop in the on position.

The Substrobe M features a six foot long coiled cord for connection to the camera or underwater housing. The flash connector is the standard Ikelite ICS

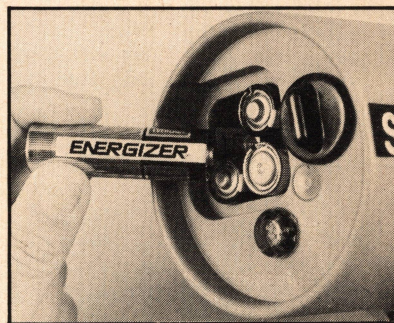
of the flash arm available. The Strobe Mount I features a single 12 inch long flash arm with a simplified baseplate mount and two-way articulation at the baseplate swivel. The Strobe Mount II features two 12 inch flash arms which are connected by an adjustable swivel and provide four-way adjustment.

PERFORMANCE

SKIN DIVER tested the Substrobe M under a variety of conditions in the waters

for ASA 64 film is approximately 18. When shooting close-ups at 12 inches, you can generally use an aperture of f16. Should you want to shoot fish pictures from three feet, the suggested aperture would be f5.6, which balances quite nicely with ambient light to give a very pleasant flash fill photograph. A simplified exposure guide sticker is provided with the Substrobe M and this offers suggested aperture settings for film speeds ranging from ASA 25 to ASA 200.

Opposite, the Ikelite Substrobe M and its big brother the Substrobe 150-L. Below, the Substrobe M features a six foot coiled cord and a standard ICS connector. Below right, the Substrobe M costs \$169.95 and operates on four AA cells (alkaline or ni-cad).



plug, which fits all Ikelite underwater housings and all Ikelite Power Packs for the Nikonos I-II, and III-IV. The Substrobe M features an ultra-sensitive trigger circuitry which will work with either the Ikelite SST or non-SST power packs.

The Substrobe M's ready light is positioned at the rear of the strobe, close to the on/off switch and battery compartment. Recycle time averages four seconds. The ready light comes on when the battery capacitor has approximately 90 to 95 percent of the full electrical charge.

A special lightweight flash arm assembly has been developed specifically for the Substrobe M. Made mostly of plastic with an anodized aluminum shaft, the entire flash arm is both inexpensive and virtually immune to saltwater corrosion. There are actually two different versions

of the Bahamas and Grand Cayman. We found the unit to be extremely reliable. The flash fired every time and there was absolutely no water leakage.

Using a set of Eveready AA alkaline batteries, we were able to obtain more than two hundred flashes. Recycle time at the beginning of a fresh set of batteries was as fast as three seconds, and by the time we had reached the 200 flash point, recycle time was eight seconds.

Should you decide to use rechargeable batteries, such as the GE ni-cads, recycle time quickens to two seconds and flash output is slightly better. However, rechargeable batteries reduce the number of flashes to approximately 150.

We found the flash output power of the Substrobe M to be quite good for its size and cost. The underwater guide number

For those interested in multiple flash photography, Ikelite has been nice enough to produce a slave version of the Substrobe M. This cordless model is known as the Substrobe MS and is triggered by a photoelectric sensor mounted directly above the flashtube reflector. It is an ideal companion to the Substrobe M, or any other primary flash unit for that matter.

Perhaps the best news about the Substrobe M is the price. This handy little unit retails for \$169.95 (the Substrobe MS costs the same). The single flash arm is \$29.95 or you can choose the double flash arm which sells for \$49.95. For more information, you can contact your local Ikelite dealer or write to: Ikelite, 3303 North Illinois Street, Indianapolis, Indiana 46208.

SCUBAPRO A.I.R.I.

TEXT AND
PHOTOGRAPHY BY
GEORGE COZENS

A.I.R. is an acronym for Air Inhalation Regulator. The A.I.R. I is not new, nor is it even a complete regulator. It is a second stage, which can be purchased separately and added to an existing first stage, or purchased as part of a complete system with either the Mark V or Mark VII first stages.

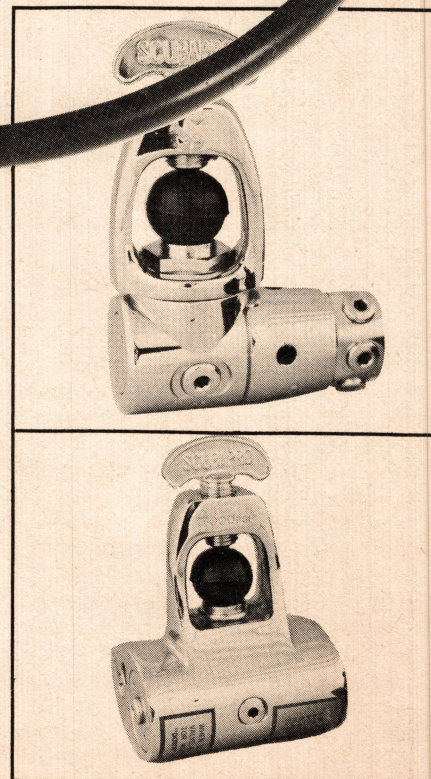
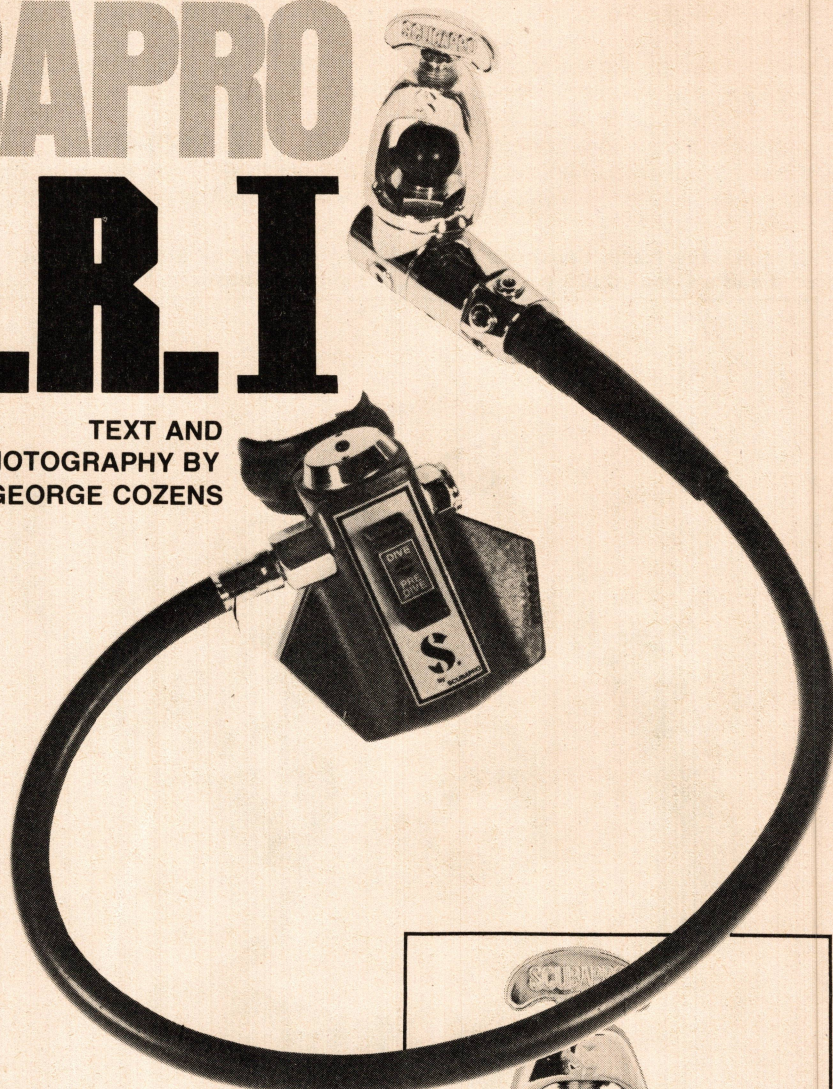
Almost two years old, the A.I.R. I was introduced in the spring of 1980. It is a balanced, coaxial flow-through, downstream, demand valve regulator. To get a better idea of how it works, let's look at its basic features.

Starting at the back door, so to speak, the A.I.R. I has a dual purpose exhaust valve/diaphragm combination. For an exhaust valve, its size is quite large — a feature which reduces the regulator's exhalation effort. As the diaphragm, it monitors pressure changes (inside and outside the second stage) — by flexing inward or outward it converts those pressure changes into movement, which is transmitted via a lever to the air supply valve. Hence, the term demand valve, since the air supply valve opens upon demand (inhalation).

The air supply valve is the heart of the A.I.R. I and is rather unique. Reduced to very simple terms this valve consists of a tube and a sliding poppet (refer to the simplified diagram). Intermediate pressure air (from the first stage) enters the tube through a hole in the side and pressurizes the interior. In the closed position, the air is prevented from leaving the tube by an O-ring seal around the base of the poppet, and the valve seat at the top. During inhalation, the pressure inside the second stage drops, the diaphragm flexes inward as it senses this pressure change, and in so doing, moves the lever which pushes the poppet up, opening the valve and letting air flow out the top. When the diver stops inhaling, the air pressure increases in-

Right, Mark V (top) and Mark VII (bottom).

side the second stage, the diaphragm moves back to its original position, withdrawing the lever as it retreats, and allowing a return spring to close the poppet and shut off the air. An important aspect in the design of this air supply valve is that it is essentially a balanced valve: intermediate pressure air acting on both the top and bottom poppet seals is very nearly selfcompensating, so that air pressure has little influence on opening or closing the poppet within the normal intermediate pressure range (128 to 140 psi above ambient). This feature allows the A.I.R.I to be fine tuned for minimum inhalation effort. However, at very high intermediate pressures (about 200 psi and above, as in the rare case of a first stage malfunction), the poppet becomes unbalanced and will open to relieve the overpressure — so it behaves like a



downstream valve. As an additional consequence of the valve being balanced, the spring which keeps the poppet normally closed can be very light, because it only needs to exert a closing force of six or seven ounces (as compared to six to ten pounds of force required to perform the same function in more conventional second stage designs). Less tension in the spring means less tension and stress on the entire valve, less wear on the valve seat, and reduced inhalation effort.

As the air leaves the supply valve it passes an aspirator port which deflects the air into the mouthpiece — in so doing, it generates a slight vacuum (venturi effect) within the second stage case, the effect of which reduces the effort required to maintain the continued flow of air during the inhalation cycle.

The A.I.R. I case is constructed of glass reinforced Valox, a strong thermoplastic polyester manufactured by General Electric. It is highly resistant to attack from chemicals, ultraviolet light, salt and moisture. The Valox is stronger and more rigid than ABS plastic and the fiberglass reinforcing increases strength and dimensional stability (i.e., holds precision tolerances much better). The shape of the case is also unconventional. The profile is low with a narrow top near the mouthpiece, and a wider, lower body. This configuration

allows easy access to the diver's nose, for equalizing, even with gloved hands. This puts the center of the diaphragm about one and three-quarter inches below the mouthpiece — a location which reduces the inhalation resistance but at a slight sacrifice in the exhalation resistance. The purge is on the back side of the case, adjacent to the diver's chin — here it is protected but can still be reached easily by the diver's thumb.

On the front of the A.I.R. I, where the purge would be on conventional second stages, is a sliding Dive/Pre-Dive switch. In the Dive position, the second stage operates at maximum efficiency, responding with great sensitivity to even slight inhalation efforts. But because of this sensitivity, while out of the diver's mouth, the regulator may freeflow with great abandon if jarred or struck sharply, or if the purge is depressed. In the Pre-Dive position, the response (or sensitivity) of the regulator is decreased, which reduces or eliminates freeflow problems, but increases the inhalation effort.

One additional feature of this second stage is that the supply hose can be attached on either side of the case.

As mentioned earlier, the A.I.R. I is available on either of Scubapro's high performance Mark V or Mark VII first stages. The Mark V is a balanced flow-through piston first stage. It provides

two high pressure ports and five low pressure ports in a swivel section. Internally, the Mark VII is almost identical to the Mark V — the difference is that the Mark VII has an additional reserve section which generates an audio signal (as well as rapid pressure pulses in the air supplied to the diver) to warn of low air pressure in the cylinder — generally it will start sounding at about 350 psi above ambient pressure.

With all the ballyhoo about efficient design, low inhalation resistance, minimum breathing effort and all those keen buzz words, we should finally ask ourselves, "Just how well does the A.I.R. I really perform?" Well, from all indications, the answer appears to be, "Superbly!"

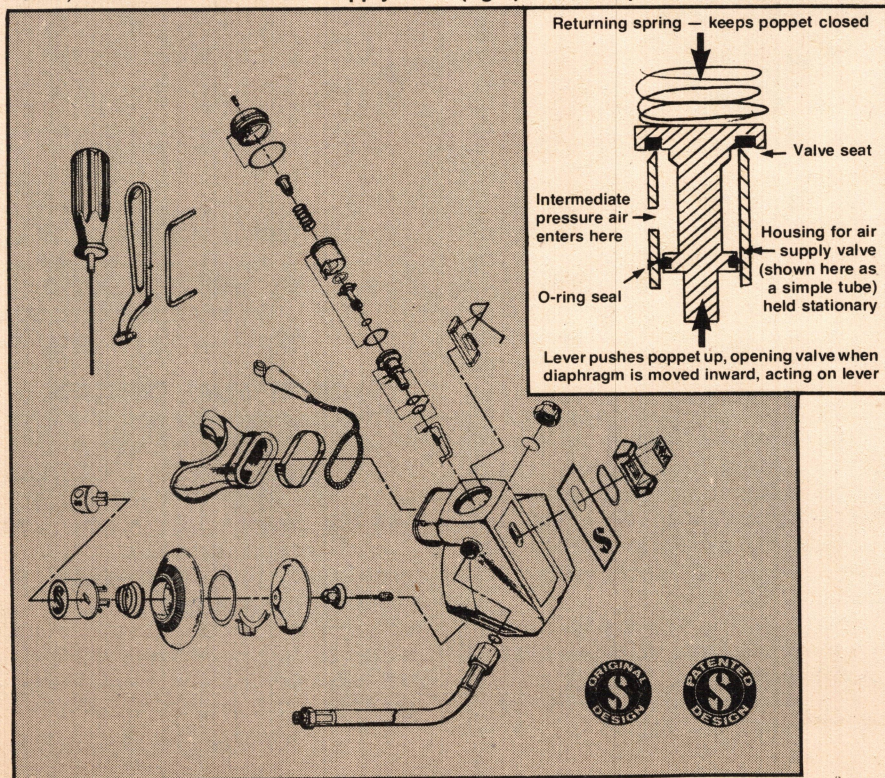
In the summer of 1979, the U.S. Navy Experimental Diving Unit (NEDU) tested 36 U.S. made regulators. The final conclusion was that the A.I.R. I on the Mark V (five port swivel) first stage was rated at the top of the high performance regulators. Since then, Scubapro engineers have indicated that the poppet in the A.I.R. I air supply valve has been improved, resulting in simplified tune-ups and maintenance, reduced or eliminated leakage from the air supply valve, and an even greater reduction in inhalation effort.

With all its merits, the A.I.R. I does have some idiosyncrasies (demerits, for you pessimists): owing to the low inhalation resistance, freeflowing can be a problem if you forget to put the switch in the Pre-Dive position when the second stage is removed from the mouth. Because air can be delivered so forcefully, purging a flooded second stage while it is held in the mouth might direct water down the throat of an unprepared diver. And, when used in the inverted position a small amount of water leakage is apparent — not enough to prevent breathing in this position, but annoying.

If purchased as part of a Scubapro regulator, or if purchased separately and added to a Scubapro regulator that is already covered by a limited lifetime warranty, the A.I.R. I will be covered by a limited lifetime warranty. Otherwise a two-year limited warranty applies. The 1981 suggested retail prices were: A.I.R. I alone — \$170; with Mark V — \$250; and with Mark VII — \$330. (The 1982 prices were not available at this writing but they will be slightly higher.)

If you are interested in buying, or just comparing high performance regulators, consider trying the A.I.R. I at your nearest Scubapro dealer. I'm sure you'll be pleasantly surprised. There's no doubt in my mind, the A.I.R. I is really an easy breather.

Below, cross section of the air supply valve (right) and an exploded view of the A.I.R. I.



TOSHIBA'S TM-II



An U/W Strobe With Optional Automatic Exposure Control

Text and Photography
by Jim and Cathy Church

Toshiba's TM-II comes complete with a Nikonos baseplate, adjustable strobe arm, remote sensor for optional automatic exposure control and a Nikonos III/IV-A connector on a coiled sync cord. The TM-II is the updated version of the TM-I.

The two sections of the strobe arm are joined with a fitting that allows you to attach or detach them by hand, and to adjust the angle of the upper section. The upper section is permanently attached (standard screw) to the strobe head; the lower section is permanently attached to the baseplate (standard screw) and isn't adjustable. The remote sensor attaches to the bottom of the arm, just below the baseplate.

The flash head measures 3.7 x 5.5 inches, the remote sensor about 1.9 x 3 inches, and the overall height of the as-

sembled unit (as pictured) is about 1.5 feet. The total system (less camera) weighs about three pounds.

The battery compartment lid, ready light port and five-position control switch are located at the rear of the flash head. The switch settings are: off, on (manual), two positions for automatic exposure control and a position for test flash.

The reflector is angled so that its rectangular beam is aligned with the rectangular-shaped picture area of the Nikonos camera when the strobe is attached to the camera in the standard 45 degree angle at the upper left side of the camera.

Most of the exterior parts of the system are made of plastic to reduce corrosion problems.

Power is provided by four alkaline AA cells that give up to about 130 full-pow-

er flashes with manual exposure control, and possibly more with automatic exposure control. Recycle time is about seven seconds with fresh cells, but (as with all other alkaline-powered strobes) the time increases as the cells wear out.

TESTING MANUAL CONTROL

For manual exposure control, the chart on the flash head gives U/W guide numbers (for apparent feet in water) of 20 for ASA 50/64, 28 for ASA 100 and 56 for ASA 400. (Note: A guide number, when divided by the strobe-to-subject distance, gives you the estimated aperture.)

Our test exposures, taken in clear Caribbean water, indicated that Toshiba's guide numbers haven't been inflated. In fact, after using these guide numbers, we judged our test slides as being slightly overexposed. Thus, in clear water, we

suggest that these guide numbers be increased to 24, 33, 48 and 64 for ASA film speeds of 64, 100, 200 and 400, respectively. The conservative Toshiba guide numbers apparently assume less than ideal water conditions.

We tested for consistency of light output with varied recycle times by flashing the TM-II at our Wein WP1000 flash meter (a meter that measures the amount of light emitted by a strobe). Flashes were made about one second after the ready light glowed, and again ten to fifteen seconds after the light glowed. The light output varied about one-third stop within the

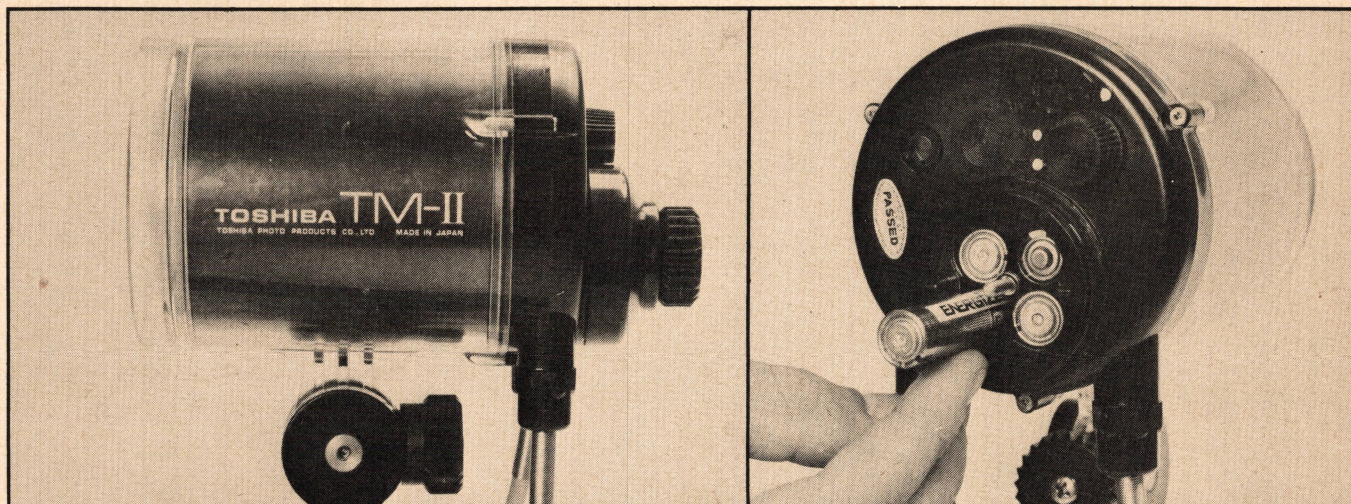
We then moved to a shallow reef to test the automatic in bright sunlight. We used Ektachrome 200 and a preset automatic aperture of f16; a level exposure meter reading indicated a sunlight exposure of f11. All of these test exposures turned out to be either excellent or satisfactory.

Our conclusion — based on our test exposures which were all taken at distances from about two to four apparent feet from the subjects — is that the Toshiba TM-II automatic exposure control works. But with the Toshiba, or any other such automatic exposure control system, there are some important limita-

maximum automatic range would probably be about four feet, depending on sunlight and water conditions. And if you choose the lower-numbered aperture, the maximum range would probably be about eight feet, but bright sunlight could easily overpower the strobe and cause an overexposure. Therefore, use the lower numbered automatic aperture for dark conditions, such as night diving.

USING THE TM-II

The TM-II is comfortable to handle and use underwater, especially if you prefer to keep it attached to your camera with



PPC staff photos/Jim Brown

minimum and maximum recycle times allowed. This variation, in our opinion, is reasonable.

TESTING THE AUTOMATIC

The control switch has two automatic positions which allow a choice of two apertures for each film speed. These are: f2.8 and f8 for ASA 50/64, f4 and f11 for ASA 100, and f8 and f22 for ASA 400. Although ASA 200 isn't on the chart, we interpolated the automatic apertures to be f5.6 and f16.

To minimize the effect of sunlight on the exposures, we began testing the automatic inside the engine room of the sunken *Cartanser Sr.* (a shallow wreck off St. Thomas, USVI). Using Professional Ektachrome 64, and a preset automatic aperture of f8, all but one of these test exposures were either excellent or satisfactory. One exposure of two fish, however, did fool the sensor. Because one fish was high in the picture, and the other low, the sensor apparently read the light reflecting from the distant background behind the fish in the center of the picture. And because this background was dark, the fish were overexposed.

TOSHIBA TM-II SPECIFICATIONS

Battery system 4 AA cells
Power settings (manual) . . Full power
Power settings (automatic) . . 2 stops
Flashes per fresh battery 130 manual
ASA 64 U/W GN (our estimate) . . 24
Beam coverage 35 mm lens
Color temperature Daylight
Connector Nikonos III/IV-A

Top right, the Toshiba TM-II operates on four alkaline AA cells. Top left, the plastic flash head measures 3.7 x 5.5 inches.

tions: (1) If the sunlight exposure requires a higher-number aperture than the automatic aperture shown on the chart, you must use the sunlight aperture or the pictures will be overexposed. (2) The sensor must read the light reflecting back from your intended subject, such as the two fish previously discussed. (3) You must stay within the range of the automatic aperture selected. If you choose the higher-numbered automatic aperture for any of the film speeds selected, the

the strobe arm. But if you prefer hand held strobe lighting, you can detach the upper section. Re-attaching the arm quickly, however, takes a little practice. For work with supplementary close-up lenses and extension tubes, the strobe should be hand held.

Although the beam angle is designed to cover the Nikonos 35 mm lens, it also gives satisfactory coverage with the 28 mm lens as well. It won't, however, cover the wide-angle picture areas of 21 or 15 mm lenses. For wide-angle photography, we hope that Toshiba will produce an accessory beam spreader that could be placed over the reflector.

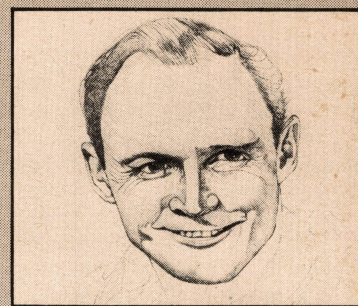
The sync cord isn't wired to activate the lightning bolt (ready light) inside the viewfinder of the Nikonos IV-A. But this isn't a significant disadvantage — the ready light at the rear of the strobe head works fine.

MORE INFORMATION

For more information and current prices, write directly to: Elmo Mfg., Corp., 70 New Hyde Park Road, New Hyde Park, NY 11040.

Technifacts

BY E.R. CROSS



Technifacts for December, 1981 dealt with diving into the past for historical objects. It seemed to us that this would be an excellent specialty for a dive shop to develop in a given area. It would only be necessary to make a study of locations where concentrations of people had gathered in historical times, then make reconnaissance dives in each site to locate the best areas.

The Scuba Shop on Sand Island Road, Honolulu, HI specializes in historical diving. Scott Cade, divemaster for the shop, told Technifacts that he has researched anchorages for old whaling and military vessels, steamer moorings, ancient Hawaiian sea battle areas and old piers in the Waikiki area. He regularly takes dive charters to these locations; usually with very positive results.

December's Technifacts pointed out that the importance of underwater historical finds is not necessarily in the object, and that it alone cannot create the window through which the diver can look into the past. This can only be achieved in context with environmental, geological and historical data.

Just as surely, recorded data will not in itself provide a permanent historical object for a study collection. Only cleaning, treating and preservation of objects will do that. Technifacts for this month is designed to provide basic steps in this area.

When historical objects are lost in sea water, several natural forces, some alone and some in combination, tend to damage or destroy them. These forces are electrical (in the case of metals), organic (in the case of animal and vegetable matter) and mechanical (possible with all kinds of matter). The rate of destruction depends on several factors such as water temperature, salinity, whether the object is buried in silt or sand and whether or not it is covered with coral or other deposits. Depth, current and wave action affect the rate and ultimate extent of destruction.

Objects lost in fresh water fare much better as damage or destruction proceeds at a much slower rate. This is particularly true when the object is buried in freshwater mud or sand. However, unless buried, glass, pottery, metal and

other hard materials will have an encrustation that is hard to remove. Wooden articles, unless buried, will eventually deteriorate completely but at a slower rate than in a marine environment.

CLEANING/RESTORING

After careful study and documentation, all objects found should be recovered and brought to the surface for evaluation and possible restoration. Such recovery should be done carefully to avoid damage to the object. It will facilitate future cleaning if all these objects are placed in a container of water until they can be studied and cleaning started. If containers are not available, wrap in wet rags or in commercial plastic wrap material. This will hold all the moisture until shore is reached.

In general, objects recovered will fall into three categories. First will be those that have suffered relatively little damage and will require mainly cleaning and possibly application of some type of preserving medium. This would include objects made of glass, brass, copper, silver (sometimes), gold and some ceramics. Most gems, stone objects and ores will be only slightly affected.

The second category would be those objects which have suffered considerable damage through chemical or organic forces. These include bones, shells, some hardwoods, some fiber ropes, iron and steel objects (usually) and pearls (in the form of jewelry as opposed to pearls in their natural state within the pearl oyster).

The third category would be those items which have suffered a great deal of chemical or other damage and are so delicate or badly worn that handling is nearly impossible. Likely to be in this category are leather, horn, tortoise shell, soft woods, some types of fiber ropes and sometimes, pewter.

Before attempting to clean recovered objects the diver should consider their potential historical value. If it is considerable it might be well for the diver to take only preliminary preservation steps then obtain professional advice or help, or to turn the object over to museum technicians for restoration.

For most cleaning by amateur collec-

tors, materials needed are usually found in the home, shop, or are readily available from local hardware or drug stores. This Technifacts will approach the subject of cleaning and restoring from this context.

Field preparation of objects recovered from sea water should include the immediate protection from drying out. If these are still covered by combination coral-sand crusts, the object, regardless of type, can be stored in sea water. If the coral-sand crust has been removed, the object should be stored in fresh water. If the object is to remain stored for some time it is advisable to use a ten percent formalin solution rather than just water. The formalin can be diluted with either salt or fresh water and will destroy marine growth and any harmful bacteria in or attached to the object.

Ferrous metals (iron and steel and their compounds) found in fresh water may suffer only light to moderate rust with no pitting but may be coated with a lime-like material. Cleaning procedures, in the case of heavy objects, include chipping off the lime coating. Then soak the object in a container in running water and use a steel brush or scraper to remove the balance of the lime coating and rust. Final touch up can be made with wet emery cloth. Delicate objects will have to be hand cleaned, using small dental tools to remove the deposits followed by treatment with chemical rust removers such as naval jelly. Then wash freely in fresh running water. Dry in the air or with a hair dryer and follow with appropriate coating such as acrylic, lacquers or polyurethane varnish.

Similar encrusted ferrous metal objects found in sea water require additional treatment. If the object is large and heavily constructed, such as an old cannon or heavy plates, the calcareous or lime coating can be chipped off by tapping gently with a hammer. Strike a direct blow and not a glancing blow as the latter will damage the metal. After as much encrustation as possible is removed, further treatment should include complete cleaning in fresh water with brushes to remove any dirt or other loose material. Next, place the metal in a suitable plastic

(Continued on Page 58)

Tekna is one of the dive industry's smallest and youngest companies. It turns out just a limited number of products. Yet in its relatively short history it has gained a reputation for quality and innovation. According to its president, Ralph Shamlan, the company is dedicated to three concepts in new product development: "Can we make it smaller, lighter, better?" The new T-2610 depth

which is ultra-strong and rustproof. Its surface is convoluted like a rippled potato chip, which adds to its strength. This feature also gives it uniform deflection properties at all temperatures, which improves accuracy. John Burr, the company's vice president for engineering, also pointed out that "... for the same diameter, the convoluted diaphragm offers greater deflection at the

TEKNA T-2610

Max Limit Indicator

By Eric Hanauer

PPC staff photo/Pat Brolier

gauge fits in with that philosophy.

It's good looking: The luminescent white dial features large black dots marking depths on a scale which goes to 240 feet in a bit over one and one-half revolutions. Research has shown that the eye can fix on a finite point easier than on a line, so all Tekna's gauges have this feature. The first complete revolution of the pointer takes it just short of the 125 foot mark. This covers the normal sport diving range, and allows for an expanded scale in the first 30 feet. The result is exceptional accuracy at the depths of potential decompression stops, 10 to 30 feet. The 130 to 240 foot portion of the scale is primarily for the professional segment of the market. But the sport diver will appreciate the deep end of the scale on that rare occasion when a wall dive beckons.

The T-2610's neoprene cover encloses a glass filled thermoplastic housing which provides the stiffness and dimensional stability of metal without its cost, weight and corrosion problems. Inside the case is a diaphragm gauge with a brass movement containing four sapphires.

The Tekna gauge exceeds industry standards for accuracy. Its allowable range in factory checks is plus or minus one-half foot at 30 feet, plus or minus two feet at 85 feet, plus or minus five feet at 160 feet, and plus or minus ten feet at 220 feet.

One of the primary reasons for this kind of accuracy is that the T-2610 is a diaphragm gauge. These are simpler and more reliable, but more expensive to produce.

The diaphragm gauge is filled with air. Water pushes on a diaphragm, then gears and levers translate the deflection of the diaphragm into the circular movement of the pointer. Tekna's diaphragm is made of a nickel-iron-titanium alloy

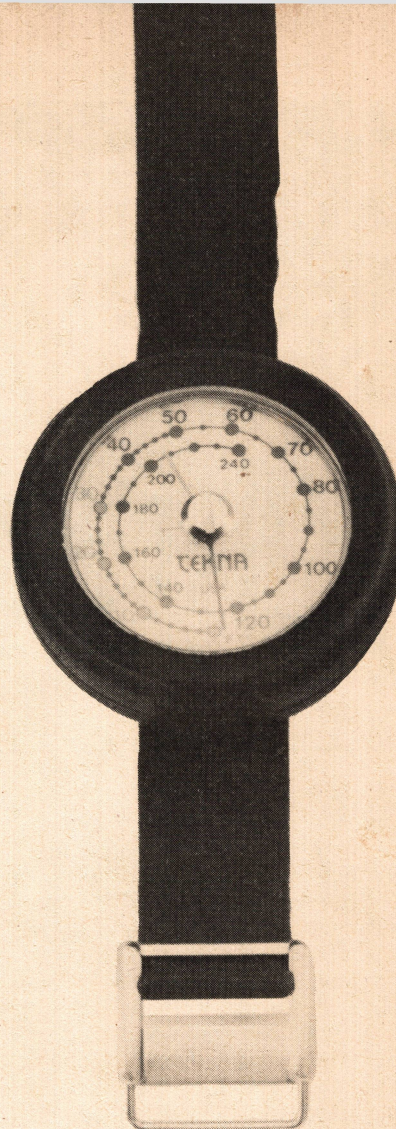
same pressure. Less amplification is needed to move the pointer the same distance. The result, again, is more accuracy."

A new feature of the T-2610 is the maximum depth indicator. Sometimes we are too preoccupied during our dive to check the depth gauge and we are unaware of our deepest penetration. In this case a red pointer, pushed by a small wire which catches the depth indicator, marks the maximum depth attained during the dive. The diver can check it at the beginning of ascent and plan his decompression, or his repetitive dive accordingly.

The small wire which moves the maximum depth indicator also allows it to go into the deep part of the scale and remain there as the needle moves back into the shallow portion on ascent.

I asked John Burr, "Doesn't the max depth needle cause drag on the pointer, resulting in false readings?" He was probably waiting for the question. He explained that the diaphragm is almost as big as the housing, one and one-quarter inches in diameter, or one square inch in area. At 99 feet, the gauge pressure is 44.1 psi. This means over 44 pounds of force is pushing the pointer, easily accommodating the minimal drag of the maximum depth indicator.

Another feature which sets the Tekna gauge apart is adjustability. What is the purpose of an adjustable gauge? There are several. First, a fall or a shock can jolt the needle off the zero mark. The diver can readjust it before a dive. If the dive is made at altitude, the needle must be adjusted back to zero as well. Because of this feature, no special precautions are needed when the gauge travels in an airplane. Finally, if decompression is necessary, the diver might want to check the 10, 20, or 30

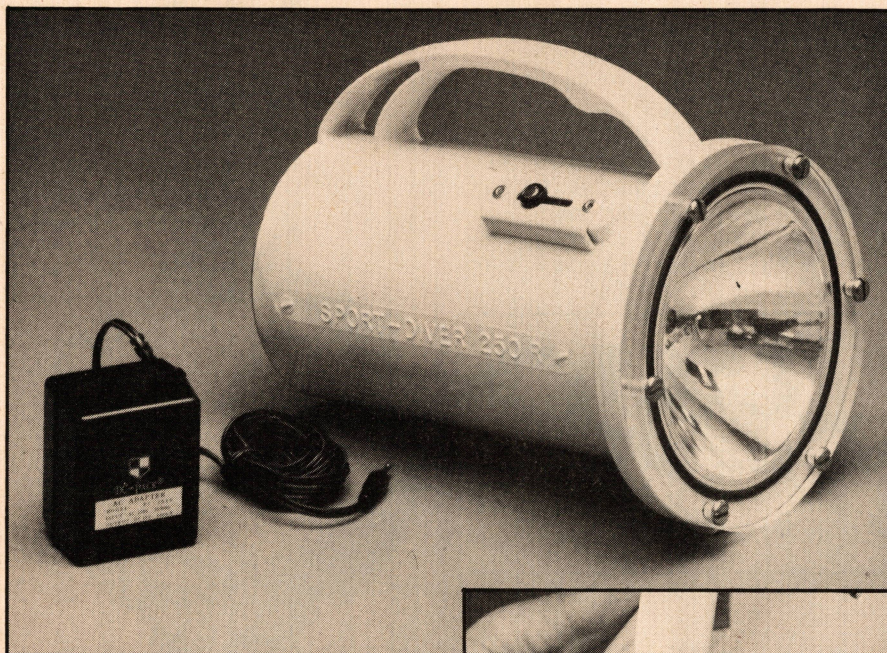


foot mark against a measured line and calibrate his gauge in the water at one of those depths. All this is done with a small knurled wheel on the side of the gauge. The wheel rotates the movement through the full range of the gauge and is easily adjusted by the diver.

Because of the adjustment wheel, only two consoles will accept the T-2610: The Tekna or the Pennform especially designed for this gauge.

Even the buckle and the strap are unique. The strap is made of Velcro, because it lasts longer than rubber. However, the lack of stretch in Velcro doesn't compensate for wetsuit compression at depth. Therefore, Tekna's engineers designed a stainless steel buckle with a spring which can take up the slack of over one-half inch of wetsuit shrinkage under pressure. I was impressed at the way the strap kept the gauge from slipping on my wrist below 50 feet.

Overall, the Tekna T-2610 depth gauge is a precision instrument which contains features and innovations that will be appreciated by the advanced sport diver and the professional as well. It is available from your Tekna dealer, in either feet or meters, and sells for \$79.95.



PPC staff photos/Jim Brown

Darrell-Allan has been producing dive lights known for their ruggedness, brightness and dependability since 1963. The Healdsburg, CA company manufactures lights only — and just four models at that.

The four lights are simply different versions of one basic model. The options are cast aluminum or ABS plastic housings and disposable or rechargeable batteries. The Sport Diver 250 has a plastic case and disposable batteries; the Bug Diver 400 has an aluminum case and disposable batteries; the Dive Bright 500B has an aluminum case and rechargeable batteries. In addition to these three there is the 250R: It is housed in plastic and has rechargeable batteries.

You may think there would be little difference between the aluminum and the plastic cases and there isn't when it comes to durability. ABS plastic is extremely rugged. In fact, a plastic case will look better longer than an aluminum case: it will not scratch or dent and has no paint to peel. The significant differences between the two cases are weight, pressure rating and price. The aluminum housings weigh just over six pounds in air and a little more than one pound underwater. They sink. The Bug Diver 400 has been pressure tested to 400 feet; the Dive Bright 500B to 800. The plastic housings weigh one and one-half pounds less in air and are slightly positive underwater. They float, beam up. This is an advantage at night because such a light would be easier to find if lost. It is a disadvantage if you want to set it down and expect it to stay in one place. Both the 250 and the 250R have been pressure tested to 250 feet. The aluminum housings cost about \$15 more



RECHARGEABLE ALLAN LIGHT

*Darrell-Allan Redesigns
Their Light
for Easier Use
and Better Safety*

By Bonnie J. Cardone

than their plastic counterparts.

All four Allan-lights are high visibility yellow and have the same dimensions: Five and one-half inches in diameter and eight inches long. The rechargeables have an aluminum port at one end which adds another half inch to the length. Remove it and the batteries can be charged inside the housing. All of the lights have magnetic switches. This means there is one less place for possible leakage because these switches re-

quire no through-housing fittings.

All of the lights also have a three-eighths inch plexiglass, flat lens, held in place with six stainless steel screws and sealed with an O-ring. The reflector is polished. The bulb recommended for use with ni-cads is the Stanley A-9 Regular Life or G.E. 500. With alkalines, use of the Stanley A-9L Long Life bulb is recommended. All four lights use 10 D cells. Darrell-Allan provides Eveready CH-50 ni-cads with the 250R and 500B. Although the manufacturer does not recommend their use, if you do use alkalines in these lights, use only nine live cells with one dead cell; otherwise the initial surge of power will shorten the life of the bulb.

There are advantages and disadvantages to both ni-cads and alkalines. Ni-cads have a shorter burn time. (The manufacturer's literature said a maximum of two hours, but my 250R burned brightly for almost three.) Ni-cads produce a light of more consistent brightness. However, you must keep track of how long the light has been on — there is little warning that it is getting low on power: The intensity will drop dramatically and the light will go out. In the long run ni-cads save money. Their initial cost is higher, but one set can be used over and over. And, of course, if you can recharge your lights when you travel you will not need to carry extra batteries. Alkalines have a longer burn time (three to four hours or more) but the brightness of the light steadily decreases as it runs lower on power.

I used the 250R on several bug diving expeditions in Southern California. The light is bright enough and the beam angle wide enough to illuminate almost any area you care to investigate. On night dives, it provides plenty of coverage and more than enough light to make navigating easy.

As already mentioned, the batteries in the 250R can be charged without removing them from the housing. Unscrew the aluminum charging port and plug the charger in. A full charge takes 14 to 16 hours and the manufacturer states that a 24 hour charge will not harm the batteries. Since the cells partially discharge when they sit, recharge them for three to five hours if they have not been used for more than three weeks. Ni-cads have a memory, so the light should be fully charged and fully discharged twice, before use, to break in the batteries.

Before taking the 250R on its first underwater foray, clean and lightly lubricate (with silicone grease) both the plexiglass lens and charging port O-rings. The charging port O-ring should be cleaned and lubricated before every dive.

Care of the Darrell-Allan light is simple.
(Continued on Page 107)

No other piece of dive equipment has more functions than the buoyancy compensator. And, over the last ten years no piece of equipment has seen more innovations than the buoyancy compensator.

At the turn of the decade, regulators, wetsuits and tanks were pretty much as they are today. But the safety vest was about to undergo a rapid evolution which would entirely change sport diving. The most recent product of this evolution is the Seatec Manta 1000. It is a premium quality unit with several very useful accessories and one very major design innovation — it eliminates the necessity of a tank backpack. Incorporated into the unit are two Seaband straps with Velcro adjustments. There is no rigid backpack and none is necessary. Separating the tank from the diver's back is a thick nylon pad. With a tank in place and the Manta on your back, it is surprisingly comfortable out of water. In the water, the tank almost seems not to be there.

This backpack eliminating design has several major advantages in addition to being extremely comfortable. With the Seabands adjusted, the unit locks onto and comes off the tank very quickly and easily, eliminating much of the hassle that comes with using most cam-type backpacks. The Seabands will also accept an extremely wide range of tanks from the large, 96 cubic foot to bottles as small as 40 cubic feet. But the part I like best is that I don't have to take a backpack with me when I travel. Backpacks are cumbersome to carry if you decide not to trust the ones supplied by the charter boat or resort to which you are going and, if you decide to take your chances with other people's packs, the cams seldom work well and the straps never quite fit. With the Manta 1000 you don't have to carry a pack with you and, in fact, you can stop thinking about backpacks entirely.

The Manta 1000 is an extremely comfortable unit to wear when inflated on the surface. It tends to hold you in an upright position with your head well out of the water. Yet, it produces no uncomfortable pressures on your chest, neck or diaphragm. It is ideal for dive instructors since it keeps the head high enough to allow comfortable conversation with other people on the surface. The amount of lift you get from a Manta depends on the size you choose. It is available in medium, large and X-large with buoyancies in salt water of 56, 64, and 71 pounds, respectively.

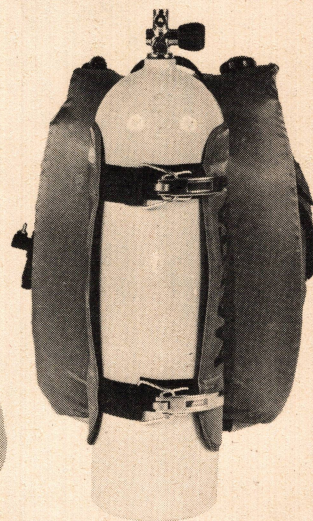
Underwater, the Manta 1000 is comfortable and convenient to use. The rapid dump valve allows you to deflate the unit without changing your position.



SEATEC MANTA

*A Different Approach
To BC Jacket Design*

*Text and Photography
by Howard Hall*



design, it incorporates a variety of other important Seatec features. It is a two bag unit, with the outer bag a durable heavy gauge nylon and the inner bag of long lasting urethane. The overpressure relief valve is located on the right shoulder and doubles as the rapid dump valve, activated by pulling a cord. The Manta also includes a CO₂ inflation device located under one of its two large pockets. This mechanism is made primarily of high strength plastic which eliminates the galvanic problems that cause metal inflators to freeze. This is a cartridge device you can actually depend on. However, if you decide to dive without a CO₂ cartridge in place, the Manta incorporates a one way non-return valve in the mechanism.

The Manta 1000 comes without a power inflator, however, you can order it with a Seatec power inflator. And this is a must. For a relatively minor additional cost (\$35.50), the unit becomes much more functional and easier to use. The cost of the Manta 1000 with the power inflator is \$340. A Velcro fastener holds it in place on the chest until you wish to use it. Other Velcro fasteners hold the pressure gauge hose and octopus regulator. In addition, there are D-rings attached to the bottom of the Manta for carrying accessories such as bags and

Many compensators, especially back units, have the tendency to shift all the air to one side if you roll slightly in that direction and you have to struggle to get the buoyancy shifted back equally. The Manta's design greatly minimizes this problem. And because the tank is held to your back with the soft material of the compensator instead of straps it is comfortable to wear when diving without a wetsuit.

In addition to the Manta's innovative

lights. And finally, for lifting the Manta when attached to a tank, there is a large, heavy nylon strap located at the top, providing easy handling in and out of boats or elsewhere.

When you choose a buoyancy compensator, you are choosing the one piece of equipment that will, more than anything else except personal ability, assure your safety and performance as a diver. The Seatec Manta 1000 is a good choice. >>>

THE THIN SUIT



U.S. Divers Produces a new lightweight wetsuit for tropical diving

By Jim Walker

As an added advantage, one-eighth inch neoprene is less buoyant. Less weight is needed than with thicker suits. I found I could use about 30 percent less weight (14 instead of 20 lbs.) than in my similar one-quarter inch outfit. This reduces the amount of buoyancy adjustment necessary at depth. Less gas in the thinner suit material makes for less wetsuit compression under pressure. (The thinner material also takes up less space in your gear bag.)

For some breath-hold divers, this suit might eliminate the need for weights completely. With a few hard kicks the diver can be down to a depth (slight suit compression) where only a little effort is required to stay on the bottom. From experience, I know this would be great for a snorkeling leader who wants to float high to watch the group, yet occasionally dive down and retrieve a specimen to show the class.

This thin flexible wetsuit is perfect for instructors who do a lot of pool teaching: not too warm, easy on and off, and non-constricting. The suit also has non-diving applications. It's flexible enough for activities such as water skiing, windsurfing and sailing.

The suit is constructed of top quality, U.S. made Kirkhill NF-12 closed cell neoprene, backed on both sides by nylon (nylon two). All seams are double glued and lock-stitched, and the thread ends are bar tacked to prevent unraveling. Edge binding also included. The zipper is made of tough, non-corroding Delrin and the beavertail has stainless steel twist locks. Dual Velcro shoulder straps allow adjustment of the farmer john pants. The suit is black with bright yellow accent strips on the neck, arms and on the sides of the pants.

In conclusion, the U.S. Divers one-eighth inch farmer john wetsuit is a good looking, comfortable, sturdy outfit that overlaps the functions of both tropical shorty suits and full-length, cold-water garments. The suit costs \$199 and is available from your U.S. Divers dealer. It comes with a one year limited warranty.

PPC staff photos/Jim Brown

only, but the thinner neoprene flexes to accommodate those in-between sizes. Combining the one-eighth inch thickness with the full farmer john style makes this suit adaptable to tropical diving as well as cooler waters.

One-eighth inch neoprene is perfect for warm water diving — flexible and not too warm. The full body coverage provides substantial protection from coral cuts and from fire coral and jellyfish stings. On those deeper, cooler reef dives and on those multi-dive days, it's also nice to have the warmth of a full suit.

This suit also has a number of advantages for cool water diving. The flexibility and stretchiness of its thinner neoprene makes up for much of the lost insulation. Since it is more elastic, the suit fits better than thicker models. The neoprene conforms more closely to the shape of the body, especially the limbs, and thus reduces water flow in and out of the suit. When combined with a hood, gloves and booties, the suit was surprisingly warm. In 60-65° F water I was comfortable for periods of up to 40 minutes.

Let's face it, thin is in. No, this isn't going to be a discussion of the latest, expensive-fruit diet. In fact, I'd put this item in the category of function rather than fashion.

U.S. Divers recently added a one-eighth inch suit to its wetsuit line. The trend in dive gear (as well as in bodies) is toward attractive, streamlined, functional items and the new suit achieves these ends under a variety of conditions.

Of the same design as U.S. Divers' Sea Diver II series, the suit is a farmer john style with one jacket zipper and a high collar. It is available in stock sizes

Scuba Quiz

Category: Emergency Swimming Ascents

By Dennis Graver

It is doubtful that any other dive skill has been as discussed and modified as the emergency swimming ascent. Thousands of divers have successfully used it to reach the surface. In spite of the hazards, the ability to perform such an ascent is valuable to all divers. See if you are current in your knowledge. The answers are on the following page.

1. A true free ascent is performed by:

- ☐ A. Using maximum lung volume to rise to the surface while allowing excess air to escape
- ☐ B. Swimming to the surface with the lungs at residual volume and all gear in place
- ☐ C. Swimming to the surface with the lungs fully inflated
- ☐ D. Floating to the surface minus the weightbelt, lungs at mid-volume and exhaling continuously

2. During an emergency swimming ascent, lung volume should be:

- ☐ A. High initially, then low near the surface
- ☐ B. As low as possible throughout the ascent
- ☐ C. Neutral — neither high nor low — throughout the ascent
- ☐ D. Any volume as long as the breath is not held

3. To prevent air expansion injuries in the lungs during an emergency swimming ascent, it is best to:

- ☐ A. Exhale completely on the bottom and continue to blow out during the ascent
- ☐ B. Exhale completely on the bottom and hold the remaining air during the ascent
- ☐ C. Blow a continuous stream of bubbles against pursed lips, as when whistling
- ☐ D. Keep the mouth and glottis open and allow expanding air to vent itself.
- ☐ E. Emit a fairly loud sound continuously during the ascent

4. Out-of-air ascents have been performed successfully from depths of:

- ☐ A. 125 feet
- ☐ B. 210 feet
- ☐ C. 265 feet
- ☐ D. 300 feet
- ☐ E. Over 300 feet

5. During which of the following situations is an emergency swimming ascent not advisable:

- ☐ A. Depth 40 feet, buddy with alternate air source, 10 feet away
- ☐ B. Depth 50 feet, inside wreck, buddy, 15 feet away
- ☐ C. Depth 120 feet, buddy, five feet away
- ☐ D. Depth 130 feet, buddy's location unknown
- ☐ E. All of the above

6. Which of the following equipment should be removed during an emergency swimming ascent:

- ☐ A. Weightbelt
- ☐ B. Scuba unit
- ☐ C. Regulator from mouth
- ☐ D. Mask and snorkel
- ☐ E. None of the above

7. Which of the following body positions are recommended during an emergency swimming ascent:

- ☐ A. Head up
- ☐ B. One hand extended overhead
- ☐ C. One hand on the buoyancy control device deflator
- ☐ D. One hand on the weightbelt release
- ☐ E. All of the above

8. An emergency swimming ascent as a training exercise for divers is recommended by:

- ☐ A. PADI, NAUI, SSI, and NASDS
- ☐ B. The Undersea Medical Society
- ☐ C. Noted physiologists and dive officers
- ☐ D. Los Angeles County legislation
- ☐ E. All of the above

9. Air can be trapped in the lungs when lung volume is very low due to collapsed airways. This air can be released by:

- ☐ A. Exhaling as forcefully as possible
- ☐ B. Emitting a loud sound
- ☐ C. Attempting to inhale
- ☐ D. Swallowing
- ☐ E. None of the above

10. The ascent rate for an emergency swimming ascent should be:

- ☐ A. 60 feet per minute
- ☐ B. As rapid as possible
- ☐ C. As normal as urgency will permit
- ☐ D. Rapid near the bottom and slow near the surface
- ☐ E. None of the above

Scuba Quiz

Answers: Emergency Swimming Ascents

1. A. Using maximum lung volume to rise to the surface while allowing excess air to escape. A free ascent is actually a submarine escape technique performed by a swimmer rather than a diver. Breath control provides buoyancy. The correct terminology for a diver's out-of-air ascent is, "Controlled Emergency Swimming Ascent."

2. C. Neutral throughout the ascent. Exhalation coupled with other physical and physiological problems can cause airways in the lungs to collapse. Air trapped in alveoli beyond closed airways can expand and rupture them. Low lung volume is not desirable during an emergency ascent. In fact, it can cause lung injuries.

3. E. Emit a fairly loud sound continuously during the ascent. "Blow and go" is obsolete, and maintaining low lung volume during an ascent is also hazardous. It is difficult to regulate lung volume by blowing bubbles. Maintaining an open airway for free ventilation of expanding air is tricky. The easiest and safest way to control expanding air is to hum loudly. When a sound is emitted, an open airway is ensured.

4. E. Over 300 feet. While sport divers should not exceed 130 feet in depth, ascents without air can be made from significant depths. One could not swim upward a long distance without air, but, by using buoyancy for lift, can conserve oxygen, vent carbon dioxide, comfortably control breathing stimulus, and ascend a long way on a single breath. Obviously, deep emergency ascents are not something that one should practice.

5. E. All of the above. The preferred action for an out-of-air situation is an alternate air source. An emergency swimming ascent is not recommended when direct access to the surface is not available, nor when it is doubtful that the surface can be reached by swimming. In these situations, buddy breathing is recommended if an alternate air source is not available. In deep water, with no buddy available, a buoyant emergency ascent is recommended to conserve oxygen during the ascent.

6. E. None of the above. The weightbelt should be retained for control during ascent unless the diver doubts the ascent can be achieved by swimming. Scuba should be retained and the regulator kept in the mouth during ascent because additional air may become available during the ascent and, even if it doesn't, just inhaling to check has advantages soon to be presented.

7. There are several acceptable answers, depending on equipment configuration, but I prefer E. How is this possible? The left hand holds the buoyancy control device deflation hose and is extended overhead while the right hand grasps the weightbelt release in case the weights need to be jettisoned during the ascent. The head is held back to see the surface rather than to ensure an open airway. Conscious people have no problem with a closed airway due to head positioning.

8. E. All of the above. For years the controversy raged as to whether or not emergency swimming ascents should be part of the requirements for certification as a diver. The Undersea Medical Society conducted a workshop on the matter in 1977 and clarified it by stating that, "Despite the statistically small risk associated with emergency swimming ascent training, the training agencies should continue to offer it." The vast majority of dive experts feel it a moral obligation to train divers in these procedures.

9. C. Dr. George Harpur of Ontario, Canada has demonstrated that collapsed airways in the lungs can be reopened with just an attempted inhalation. This is the basis for the recommendation to leave the regulator in the mouth and to attempt momentary, periodic breathing. If air is obtained, the ascent will be easier. If air isn't available, the momentary attempted inspiration will assist in lung ventilation and help prevent air from being trapped in the lungs.

10. C. As normal as urgency will permit. An ascent should not be hurried even when no air is available to a diver. To double your speed through the water requires four times the energy, which results in a carbon dioxide buildup and a strong urge to breathe. A steady, normal pace with slight assistance from increasing buoyancy is recommended.

Were you aware of all the revisions to emergency ascent procedures? If you did not score well, study the questions and answers and make sure you know how to respond correctly if an emergency swimming ascent situation should ever occur. Remember to always discuss emergency procedures with your buddy before diving together. If you have not been trained in the emergency swimming ascent procedures as presented in this quiz, consider taking refresher training from your local instructor.

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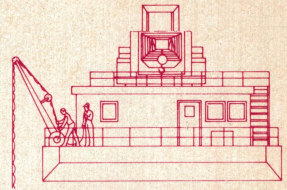
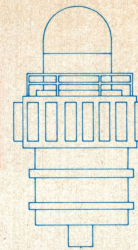
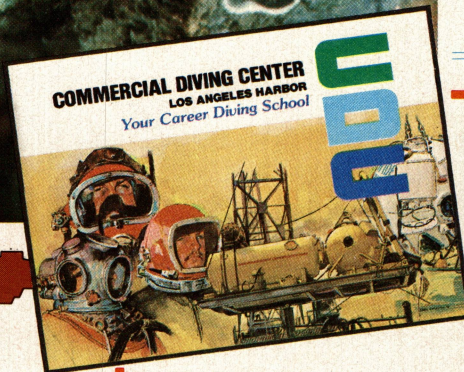
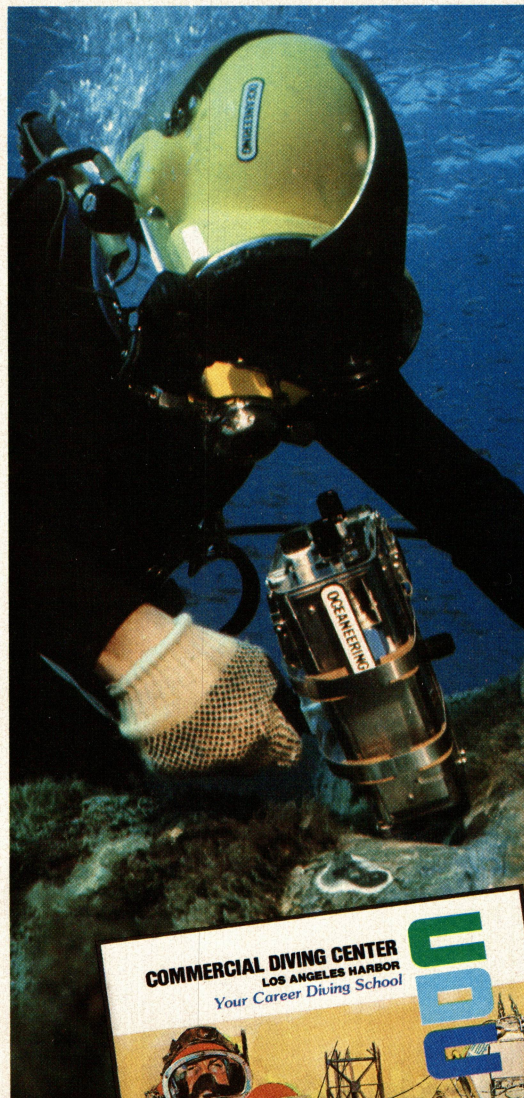
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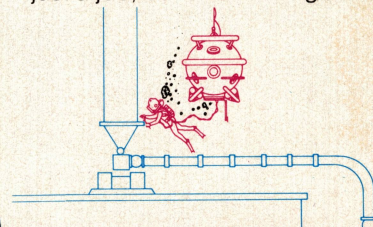
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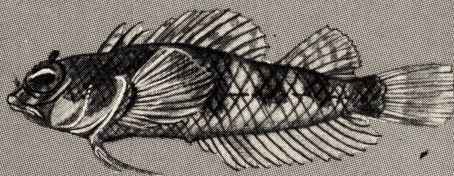
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The Redeye Triplefin

(*Enneanectes pectoralis*)

The small, eel-like blennies are among the most intelligent of fishes. They have strong pectoral fins with which they prop themselves up for a better view of their surroundings, and they also use these fins to walk short distances across a coral head or rock. They are known to use the pectoral fins like hands to manipulate objects as well. With their big eyes looking out from their hiding holes, they appear to be quite alert. Many of them hunt by sight. These fishes are relatively fearless, and divers can get quite close to them to take photographs or simply to make observations. Ichthyologists Carleton Ray and Elgin Ciampi give an unusual account of the fearlessness of blennies when they describe one particular instance wherein a number of these fishes crawled over them, their tiny pelvic fins providing all the locomotion they needed. □ The triplefins comprise a subdivision within the blenny group and are scientifically designated as the family Tripterygiidae. However, ichthyologists are not in total agreement about the classification of blennies. While there is no disunity about the two major blenny subdivisions — Clinidae and Blenniidae — the third grouping is still subject to conjecture. Some scientists consider the Tripterygiidae as a separate family while others include them within Clinidae. The clinids are blennies with fixed, conical teeth rather than the row of close-set, comb-like teeth found in the Blenniidae. The tripterygiids are distinguished from both groups because their dorsal fins are divided into three distinct segments rather than the one or two. Bohlke and Chaplin have also noted that American tripterygiids have ctenoid scales rather than the cycloid scales of the clinids. The tripterygiids



are all small (less than two inches long) and often have five dark bars over the length of their bodies. They are usually found in the protective shelter of a reef although they will sometimes be seen out in the open, foraging for their invertebrate food.

□ The redeye triplefin (*Enneanectes pectoralis*) grows to about an inch and a half in length and looks very much like the mimic triplefin (*E. jordani*), the juveniles of the two species are very difficult to tell apart. In the adults, the anal fin of *pectoralis* is evenly pigmented, while that of *jordani* has dark

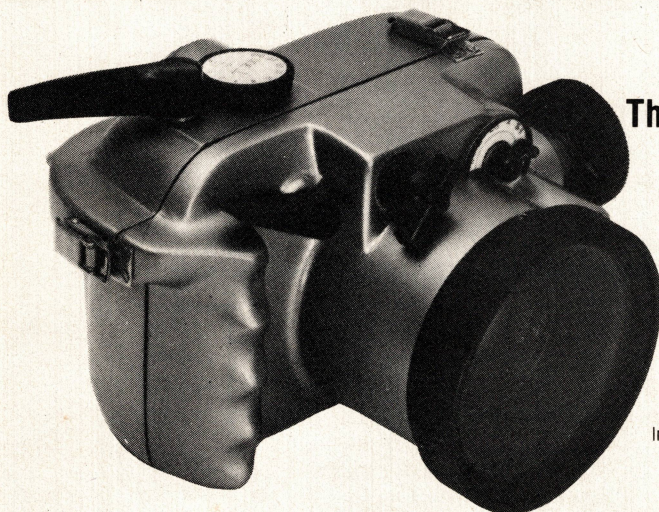
bars. *E. pectoralis* is a common species in the Bahamas, and Bohlke and Chaplin report that its range is from Florida and the Bahamas south through the Lesser Antilles. The habitat of the fish is usually associated with limestone or coral formations, in shallow water or in

tidepools. The redeye triplefin has five dark bars over its body, characteristic of its species. (These bars are pale on our pictured specimen.) The bar at the base of the tail is the darkest of all the markings. □ The mating behavior of the blennies is much like that of the gobies. The male selects the nest and then works to attract the female by either doing push-ups on his pelvic fins or by bumping her repeatedly with his nose. After the eggs are laid the male watches over them, chasing off intruders and guarding the nest until the eggs hatch. The young blenny drifts in the ocean currents during its larval stage, then migrates to a littoral environment where salt and fresh water mix to form a brackish nursery for many other young sea animals. Here in its estuarine shelter, the blenny begins to grow, adopting the physical and behavioral characteristics of the adult before returning to the sea. >»»»

Photo By Paul Humann - Text By Hillary Hauser

Paul Humann took the photograph in 70 feet of water on the North Wall, Grand Cayman. He used a Nikon F with a 105 mm micro lens in a Farallon/Oceanic housing, Farallon/Oceanic 2001 strobe. Shot at f16, 2 feet from subject.

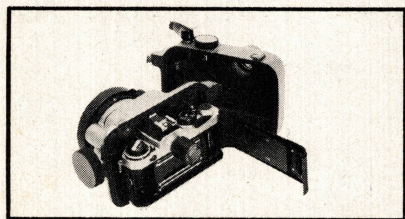
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RX FOR DIVERS

(Continued from Page 27)

might. Especially suspect are drugs that reduce ability to respond to stress. Require medical exams, and talk to the doctors.

Question: Murray Marks of Sharon, MA has had his inguinal hernia repaired. His surgeon advised he gradually resume physical activities over a six week period. After that, wonders Murray, will donning tank and weightbelt and kicking fins endanger the repair?

Answer: Six weeks may suffice for firm healing. If your doctor is satisfied that there are no complications and ok's strenuous sports, you should be able to dive without worrying about it.

Question: David Miller of North Arlington, NJ hasn't dived since his shoulder came apart in a motorcycle accident. The surgeons reassembled him with three metal rods in the collar bone and lots of stitches in the ligaments. He's healed, and two of the rods have been removed. The question is, if he dives, might squeeze or reverse squeeze affect the holes where the rods were? Also, will the shoulder be more susceptible to bends?

Answer: This question brings back memories. When we bought a big, red Harley-Davidson, friends called it a suicide. It wasn't quite, but we too learned that diver safety is promoted by spending more time in the water and less on motorcycles. Go ahead and dive. When rods are removed from a bone the holes fill up with tissue fluid, so there is no gas phase and no danger of squeeze. Whether bends is more likely isn't really known, but we think the risk small if you follow the rules. 

This is the last material submitted by the late Dr. Brown for this column. Rx for Divers will continue to appear in SDM under the authorship of a doctor yet to be named. Editor.

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The Number 16 Workboat, an inflatable designed by British divers for handling some very tough dive conditions, will be used by the Carib Inn to explore Bonaire's north and east coasts. Due to the extreme portability of the boat, Carib Inn divers will be able to enjoy diving many truly virgin areas. Already, many new spots have been located.

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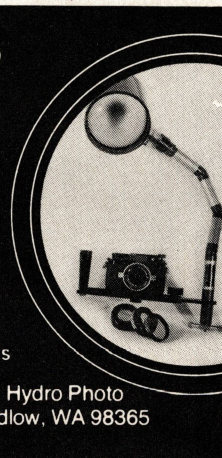
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salvage and repair, inspection, underwater farming, etc. *We do not specialize only in the oil industry as some schools do.*

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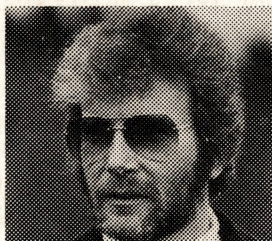
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TECHNIFACTS

(Continued from Page 46)

or wooden container and pour in a solution of muriatic acid and water. Acid treatment should be watched carefully as this may take from a few minutes to several hours or even days. As long as the acid is working bubbles will be seen rising from the metal object. When bubbles stop forming, change the acid bath, repeating treatment until the object is clean. Delicate materials will probably respond better, and more safely, to the use of a ten percent solution of nitric acid with frequent washing and examination to prevent damage. Again, dental tools may be useful in spot cleaning coral and lime encrustations. Follow any chemical cleaning with thorough and complete washing in fresh, running water. Always wear rubber gloves and protective eye coverings when working with chemicals.

Brass and copper that are not too heavily coated may be cleaned by first removing any calcareous or lime deposits then soaking in a ten percent solution of nitric acid. The deposits can be removed by gently tapping with a small hammer (if the object is solid and not corroded away). If a bright finish is desired, first chip off the heavy deposits, then soak objects in a solution of two ounces ammonium hydroxide, eight ounces oleic acid, and three ounces of acetone mixed in three ounces of warm water. Mix this solution with one part to seven parts of warm water. Brass and copper are quite soft and should not be polished with a brush. Instead, after the surface has been cleaned with the cleaning bath, rub the object with a paste made with warm water and baking soda.

Coins and other gold objects are usually not tarnished although gold alloys may have some discoloration. Also, in sea water, gold objects may have calcareous deposits that must be removed. Usually, this can be done by soaking the object in a 10 to 15 percent solution of nitric acid.

Silver objects found in sea water will often be reduced to a mass of silver salts or covered with a combination of chlorides, carbonates or sulfides. If the object is completely converted to its salts, restoration is not possible. However, such blobs may contain objects in the center that are of value. Silver blobs can be x-rayed and, if internal objects appear of value or interest, it is possible to break away the external crust.

Silver objects that have been cathodically protected by having been in contact with iron will show little damage and can be restored by first gently chipping away heavy deposits followed by soaking in a ten percent solution of lye (one part lye to ten parts water). Soak until

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the encrustation is pasty and loose, then rinse well. Repeat soaking in fresh lye solution until the desired condition is reached. Follow this with a complete rinse in fresh water and then rub with a warm water soda paste.

Metal objects can be at least partially restored by the use of electrolytic (electromechanical) reduction. This process, if complete success is desired, is usually considered an area of restoration not within the scope of most divers. However, some of the more simple cleaning of small objects might be possible and methods are discussed here with the warning that they might not result in complete success and might result in the loss of the article.

One collector has successfully cleaned copper objects by wrapping them with copper wire. The object is then suspended in a glass or plastic container in an electrolyte made by adding one-half teaspoon of lye to each cup of water required to cover the object. A nickle is also wrapped with a copper wire and this is also suspended in the solution. Connect the wire from the nickle to the plus side of a DC power source, such as a battery, and the wire leading from the object to the minus side of the power source. Bubbles rising from the object will indicate a reaction is taking place. Depending on the condition of the object, cleaning time may take from an hour or two to several days. Experiment with

batteries as a source of power. A rechargeable battery, such as a car battery, will prove most economical in most cases.

A very successful method of electrolytic cleaning of silver and of other metals has been developed by the Texas Archaeological Research Laboratory, The University of Texas at Austin. A paper discussing their techniques was presented at the Proceedings of the 3rd Scientific Symposium of CMAS and was published by the British SubAqua Club, 160 Great Portland Street, London W1N 5TB, England.

Divers should be aware that successful treatment by electrochemical methods requires a very long time; up to one year for large objects such as old cannons, anchors, etc. But if treatment is not completed in a thorough manner the iron objects will continue to deteriorate at a quite rapid rate until they completely crumble away.

Small iron objects may be preserved by a similar chemical treatment. Keep the object wet, preferably immersed in fresh water. Then, gently chip off all coral or lime deposits. This action will also remove most of the heavy, loose rust deposits. Make a solution of one part lye to nine parts water. Place this in a plastic (or stainless steel or porcelain) pan or container. Soak the iron object in this for up to one month. For faster processing, place the object in a bath in a metal container

on a stove and heat at low heat until the outer layer is softened, usually six to eight hours. Next sprinkle zinc granules (made by holding a bar of zinc against a grinding wheel, or by finely shaving a bar of zinc) into the bath. A reaction will take place within an hour or so. If heat is applied to the bath, let the reaction take place for up to eight hours. If no heat is being used, soak for up to 20 days, or until a whitish deposit covers the iron object. Remove the object and immerse in a plastic container with enough five percent acetic acid to cover it. Periodically agitate the container until the deposit is removed from the object. Next soak the object in distilled water, with occasional agitation, for several hours.

This process alone will not usually completely restore the oxides nor stop internal decomposition. Even coating with varnish or lacquer will not stop this. If the object has considerable value it is advisable to embed the object in clear casting resin. Most hobby shops have material and booklets on this technique or see SDM, November 1978.

Stainless steel ultrasonic cleaning instruments, used in dental and medical labs, when filled with any of the chemical baths described previously, give good results in less time than normal treatment. This process is used to remove deposits of various kinds and would not be suitable for electrolytic restoration.

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Adventure Diving in BRITISH COLUMBIA

By Jack McKenney

During the winter it's cold and it rains a lot, or at the very least it is overcast much of the time. But on those days when the skies are clear and a bright sun warms the air, British Columbia is one of the prettiest sights on the North American continent. This westernmost Canadian province also provides some of the finest diving in Canada.

In the spring months the heavy plankton bloom in these northern Pacific waters is responsible for an incredible diversity of underwater life, but visibility is limited. However, from November through mid-March the plankton subsides and water clarity improves dramatically. Therefore, it is the winter that provides the very best dive conditions off British Columbia. At around 46°F the water is mighty cold, and although a few hardy souls still dive with wetsuits, a drysuit is definitely recommended.

A few years ago, Frank Scalli, national sales manager for U.S. Divers Co., and I talked about my producing a number of promotional dive/travel films for use in my lecture series. To date, I have produced three, sponsored by U.S. Divers, covering diving in the Red Sea, Florida and California. One we thought would be interesting and certainly different would be a film on the Pacific Northwest, a drastic departure from the other, warmer locations. But, I opted for going still farther north to British Columbia, where I knew the abundance of marine life was even greater.

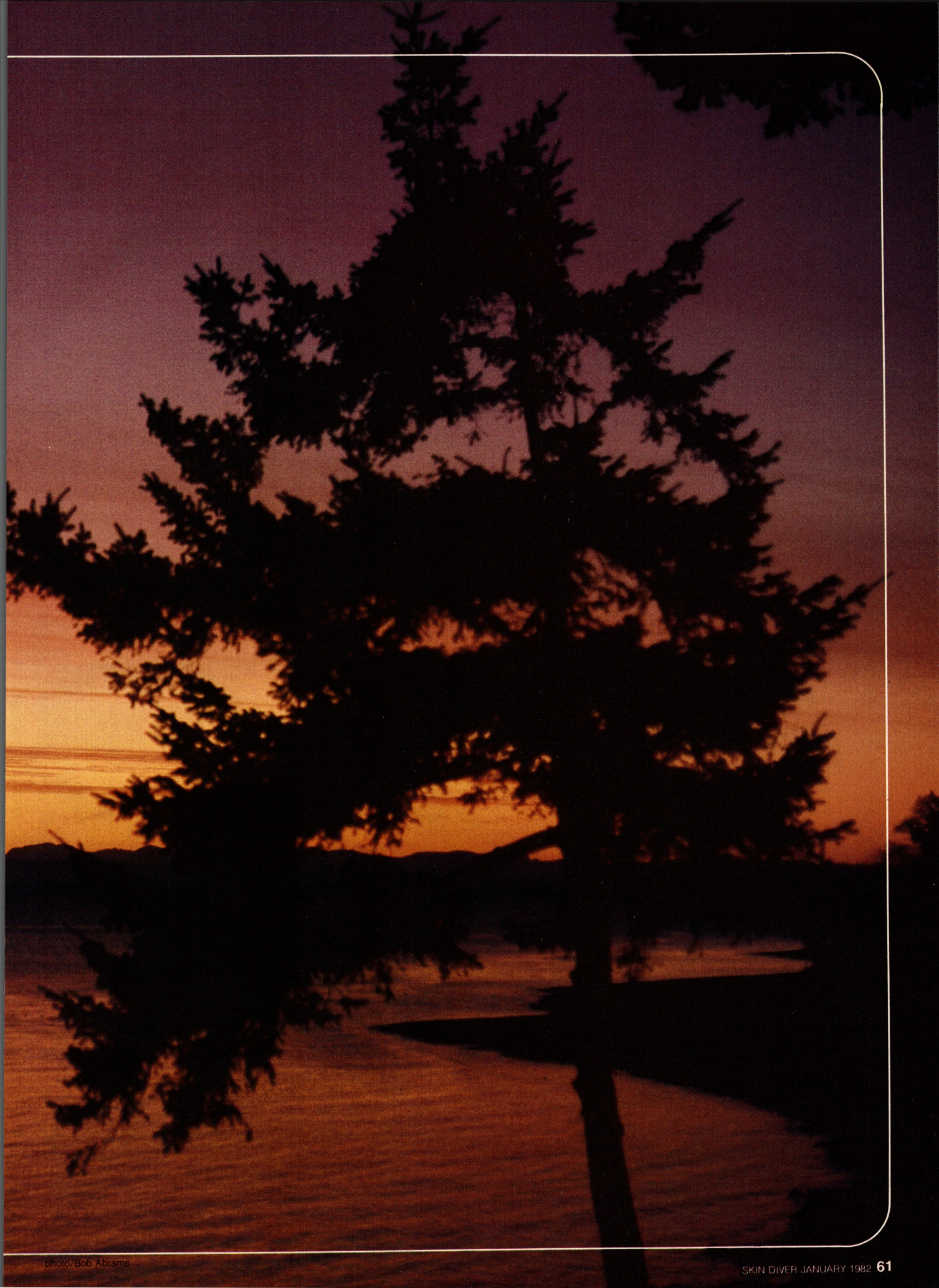
Opposite, sunset on the rugged British Columbian coast. Lower, this swimming scallop spreads its valves revealing its orange mantle. Right, Neil McDaniel holds a large octopus. In British Columbia, these animals grow larger than anywhere in the world. Upper, a white-lined nudibranch.



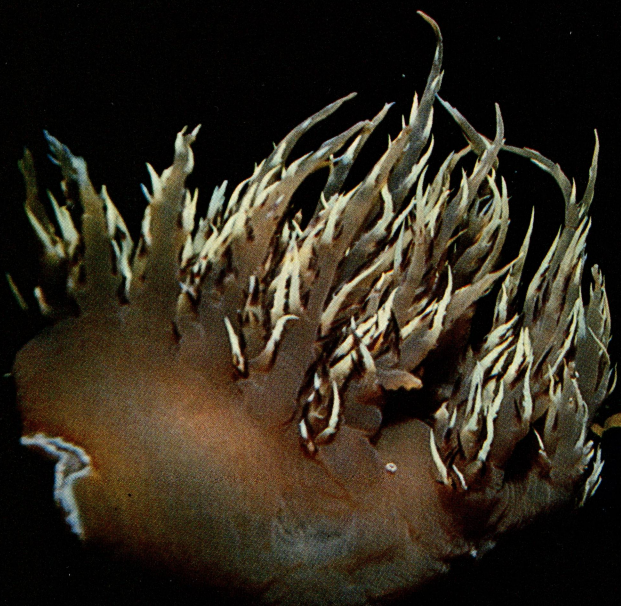
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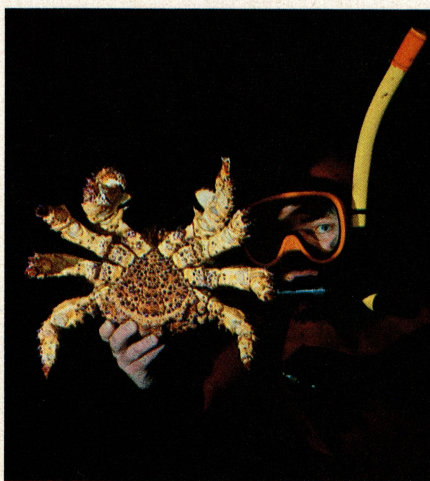
photos/Bob Abrams

Peter Vassilopoulos, publisher of Diver Magazine, convinced me that British Columbia would indeed, be an excellent base of operations, owing to the assistance and hospitality we could expect from Dive B.C. Dive B.C. is an organization of various hotels, airlines, dive stores, manufacturers and travel agents with one common goal — to promote and inspire the growth of diving in British Columbia. This fledgling group did indeed roll out the red carpet and made our stay a very productive one despite inclement weather.

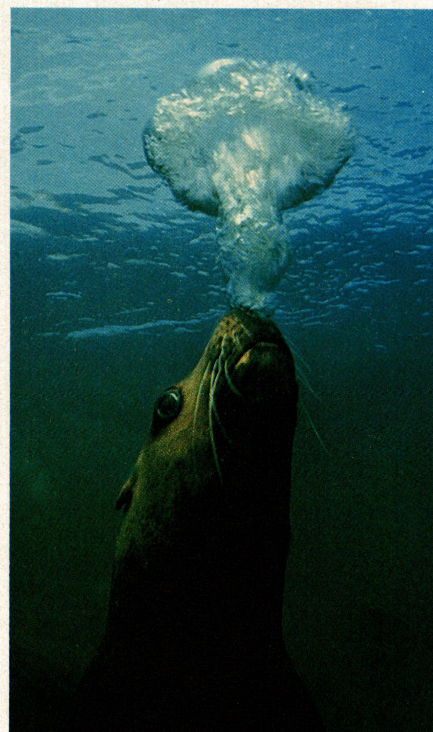
British Columbia has approximately 17,000 miles of convoluted shoreline. Two massive island groups, the Queen Charlotte Islands to the north and Vancouver Island in the south, are located off the mainland. In addition, there are hundreds upon hundreds of inlets, channels and deep fjords which cut into the mainland providing thousands of dive spots, many of which are still literally virgin.

Because of its high latitude (it sits on the 49th parallel), British Columbia experiences a fairly large tidal flow ranging from nine feet at Victoria up to 25 feet at Prince Rupert. These tidal currents are largely responsible for the abundance and variety of marine life, especially in the sessile filter and suspension feeders (sponges, bivalves, tunicates, anemones, etc.), which thrive on plankton.

We picked three locations from which to work — Powell River and Campbell River in the Strait of Georgia and Barkley Sound on the western coast of Vancouver Island. Although there are other



Top, a self portrait of Bob Abrams and a giant, anemone-eating nudibranch. Middle, excited sea lions churn the water. Lower left, a diver holds a box crab. Lower right, a sea lion blows bubbles and admires its reflection.



photo/Jack McKenney

excellent dive locations, it was logistically impossible to work them in during the course of only four weeks on location. Peter assured us that what we would see in these three areas would be quite representative of the province.

DIVING POWELL RIVER

Powell River was our first location. We stayed at the very comfortable diver-oriented Beach Gardens Resort. Basically, Powell River is a one industry town — MacMillan Bloedel, the largest pulp paper company in the world. Realizing that it could be disastrous to depend totally on one company to keep them in business, some five years ago Beach Gardens Resort decided to promote itself as the dive destination in B.C. Nestled in a grove of tall fir trees by the water's edge, the resort is attractive, has comfortable accommodations and superb cuisine. And right next door is Sunset Coast Marine, a well stocked dive shop offering sales, rentals and an excellent dive boat, the *Underwater Sunshine*.

One of the biggest attractions at Beach Gardens is diving with Jim Willoughby, the resident pro. It's difficult to tell whether Jim is a diver first, or an entertainer first. Between dives he regaled us with jokes and stories, informative bits of trivia and magic tricks. Ask any old-time diver in British Columbia who his dive instructor was and chances are he'll say it was Jim Willoughby. Jim's dive history goes back over 25 years, but his enthusiasm, like that of a beginner, is highly infectious.

Each morning we would board the spacious *Underwater Sunshine* for film excursions from 30 minutes to two and a half hours away. Cruising these very beautiful northern Canadian islands is in itself worth the trip. But I soon found out that it was the diving that made this area extremely attractive to over 6000 divers a year. True, at 46°F it was cold, and the best visibility we had was about 40 feet, but, the invertebrate life was rich, colorful and prolific — a paradise for still photographers. We concentrated on two sequences for the film here — the legendary giant Pacific octopus and the Steller sea lions.

An hour and a half run out of Powell River took us to the Copeland Islands. A dozen craggy tree-topped islands, they appear to have spilled off an artist's canvas. It was here, one rare bright sunny morning, that we found 20 to 25 Stellers sunning themselves on the rocks. Jim suggested we anchor the boat around the tip of the island some 300 yards away and swim underwater to where they dozed. My wife, Sari, Bob Abrams, Jim and I bundled up in our long woolen underwear and drysuits, strapped on our tanks and slipped quietly into the water. As we swam along in the emerald green

depths, I would quietly break the surface periodically to determine our position. When we were in front of the huge animals, Jim went up and frightened them into the water. I had positioned myself seven or eight feet from the water's edge, about four feet down. Bob was in the same position 30 feet opposite me. These are big animals — eight to nine feet long and weighing upwards of a ton. We wanted to be situated so that if a sea lion jumped, rather than slid, into the water, he wouldn't land on top of us. When Jim broke the surface, flailed his arms about and created a ruckus, most of the animals hurtled into the water. What could have been a bruising encounter, turned into a rather funny one. I was blocking the path of one huge male who didn't see me until his snout was literally one foot from my camera. The look of surprise on his face was really comical. He came to a screeching halt, snapped back his head and veered off toward Bob. About 15 animals inquisitively swam around us. They would spend only a minute or two, then swim off. Buck, our boat captain, would herd them back in our direction with the outboard motorboat.

When they came back we would sink down to the bottom and wait for them to appear out of the gloom. Like submarines they would glide in doing graceful pirouettes and acrobatics. They were impressive animals, much larger than the California sea lions we would see later on the west coast of Vancouver Island. While there are about 5000 Stellers in British Columbian waters, they are also found in large numbers off Alaska, Siberia and the Kuril Islands off Japan.

Texada Island was chosen as the film site for our octopus sequence. It was a drizzling dark day when we descended 60 feet to look for our quarry. Octopus grow larger here than anywhere else in the world. The arm spread of an adult may reach 30 feet. We were hoping to find an animal with a six or seven foot spread.

An octopus den is fairly easy to spot because the animal is a messy housekeeper; a litter of shells can be found outside its door. We found such a spot and sure enough, there was our big octopus. Jim stationed himself in front of the den and proceeded to arouse the octopus' curiosity by wiggling a finger at it. Enticing an octopus out of its home is not an easy matter. The octopus is a very shy and retiring animal. After a short period of time it extended a tentacle and attached itself firmly to Jim's arm. When Jim figured that he had enough of the tentacle outside the den he reached in, grabbed another, and pulled the animal out. It was a beauty!

Our octopus weighed in at about 30 pounds and its tentacles from tip to tip

stretched seven to eight feet. Both Jim and the octopus were instantly grappling, with the octopus squirting ink in Jim's face and wrapping tentacles completely around his neck, tank and both legs. At one point a tentacle snaked out and grabbed one of my camera controls.

Octopuses are masters of camouflage. Changing color quick as a wink from mottled brown to red appears to indicate that the animal is angry. Their skin texture can change from smooth to pebbly and grow horns right in front of your eyes. The octopus has no bones other than a sharp beak which is used for feeding and, rarely, in self-defense. Because it is boneless, a 60 pound octopus can squeeze through a hole two inches in diameter.

An octopus propels itself by squirting water through its siphon, and it can tip-toe along the bottom, or sail through the water, by spreading its mantle. The eight arms have approximately 240 suckers in double rows. Each one-quarter inch sucker has a pulling power of six ounces; when all 240 suckers are attached, an octopus has an extremely effective holding force. Despite this, once off the bottom the octopus is relatively easy to subdue because it usually attaches itself to any solid object, even if that object is a diver. And, the animal tires easily, so by keeping it active for a short period of time you can gain control.

To me the octopus is one of the most interesting and appealing animals. It is intelligent, curious and amusing. Our octopus performed well in front of the camera and we released it at its den so it couldn't be caught by one of its predators — a wolf-eel, seal or another large octopus.

At the Iron Mines we dived to 140 feet to film magnificent white and yellow cloud sponges and touched down to 160 feet to shoot red gorgonian coral. Jim also insisted that we dive Okeover Inlet, behind Malaspina Peninsula — a two and a half hour trip by boat or a 45 minute drive by car — because of the abundance of nudibranchs we would find there. The trip was well worth it. I filmed the rare orange spotted nudibranch and a funny sequence with a swimming scallop, a dead ringer for President Jimmy Carter. After Okeover, Powell River Air Service took Murray Hamilton, then assistant manager of Beach Gardens Resort, and I, up for an hour of filming aerials. This ended our ten days at Powell River.

Traveling from Vancouver up to Powell River by vehicle requires the use of two ferries — one from Horseshoe Bay to Langdale and the other from Earl's Cove to Salter Bay. Now a third ferry was necessary to go from Powell River over to Comox on the east coast of Vancouver Island, for the drive up to Campbell River. The ferry rides were pleasant inter-

ludes that allowed us a few hours to relax and enjoy some very beautiful scenery. Campbell River, long noted as a salmon fisherman's paradise, is located at the northernmost end of the Strait of Georgia at the gateway to Discovery Passage, and was to be our next base of operations for ten days.

DIVING CAMPBELL RIVER

We headquartered out of Delta's Discovery Inn, courtesy of Mel Polley. Down the street from the Inn, Seafun Divers, Ltd., offered sales, rentals, air, instruction and charters.

Art Bennett, the quiet, soft-spoken divemaster, was to be our host. Art and I discovered we had a lot in common. We were both born and raised in Windsor, Ontario and were just a year or two apart at the same high school. Art started diving six years ago when he moved to Vancouver. Now he has his own business called Alfadur which in Nordic means, "The All Father." He designed his own dive boat, which is really ideal for the sometimes turbulent Campbell River. It's flat bottomed, fast and stable with lots of room for dive gear.

The Powell River has a lot of good diving spread out over a large area, but Campbell River has everything concentrated into locations just five and ten minutes away. Very rich reefs at places like Row and Be Damned, Copper Cliffs and Whisky Point offer colorful invertebrate life. But, you can only dive Campbell River during slack tides. This limited our diving to approximately two, one hour periods each day. However, there were places we could dive with a minimum of current just about anytime of the day. One of these, which proved to be my favorite, was off the Grouse Island dock.

Grouse Island is five minutes from the Discovery Inn. It's a beautiful seven acre island that is owned by a Vancouver businessman. Art lives in one of the two cabins there. Many days we would anchor the boat at the dock and dive in the narrow quarter-mile channel. During lunch we would strip down to our long johns and warm ourselves in front of a blazing fire in Art's rustic and comfortable cabin. How he's envied by many of his colleagues, living on his own island.

The diving at Grouse Island primarily offers macro and close-up photography. It was like diving in a relatively clear river. Maximum depth was 70 feet. But most of the time we worked in 20 to 40 feet of water. There were a few old beer bottles on the bottom, some car tires, a sunken boat and various other modern discards. But, there were also brilliantly colored sea stars, swimming clams, octopus and giant, frilly nudibranchs.

Many of the serious divers in B.C. ulti-

mately become interested in photography and 90 percent of them end up specializing in macro and close-up work. With limited visibility and the fantastic amount of miniature underwater life, it is a natural direction for underwater photographers to take. I found myself wanting to film nothing but close-ups and I became especially intrigued with the very beautiful giant (eight to ten inches long) nudibranchs. They vary in color: milky white with black tips, white with bright orange tips, dull red and various colors in between. If picked up and let go, they would undulate with violent side-to-side jerking movements through the water much like the Red Sea's Spanish dancer. The current would carry them to new pastures where they would settle down to feed.

Neil McDaniel, one of the most respected marine biologists in British Columbia and editor of Canada's Diver Magazine had joined our team at Powell River for a couple of days, along with Doug Cameron, a fellow underwater

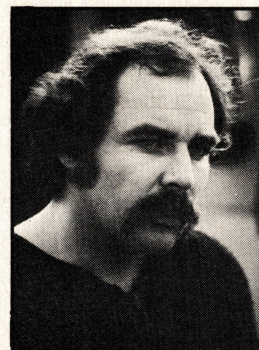
rears its head up like a cobra, spreads a set of boneless jaws wide open and lunges forward, thrusting its head into the tube. More often than not, because it's sightless, it misses and bangs its head into the sandy bottom!

At one point, I watched one of these giants come in contact with a sea star, a nudibranch predator, whereupon it abruptly lifted off the bottom and swam away.

On another dive I was trailing behind Art, when suddenly he turned and started waving his arms. Ahead on the sandy bottom were two octopuses, one throttling the other. The larger animal had its tentacles tightly wrapped around the other, literally squeezing the life out of it. And, already, two voracious sea stars were starting to feed on the loser. I filmed the life and death struggle and after the victor slithered into his den because of our disturbing presence, we pulled the sea stars off the loser who was too weak to swim away. When we returned to the site later the octopus was no longer



photo/Tim Poole



photos/Jack McKenney

Left, Jim Willoughby of the Beach Gardens resort in Powell River. Above left, Ron McCaffrey, formerly in charge of the Canadian Princess' dive operation. Above right, Art Bennett, divemaster at Campbell River.



The Canadian Princess and her dive boats.

photographer. Now, Neil along with Lou Lehmann, another top notch B.C. photographer, joined us once again for a couple of days of diving with Art. Neil told me about a most unusual feeding practice. Giant nudibranchs have no eyes and when one comes in contact with a tube anemone — a principle source of food — the nudibranch stops and lines itself up with two tentacles. When it determines that it is in the correct position, it

there. Perhaps he managed to crawl into a hole somewhere to recuperate. We hoped so.

Neil and Lou insisted that we travel north for about 100 miles to a remote logging camp called Telegraph Cove. Ralph DeLisle and Mike Burden took us out to tiny Stubbs Island — ablaze with color underwater. For still photographers this area is a paradise. We filmed giant white *Metridium* anemones and other invertebrate life in bright reds, subtle pinks, oranges and yellows. Back at the dock we discovered some bizarre hooded nudibranchs. We had filmed some two inch coffee colored species in Powell River, but these were up to ten inches long and milk white. They were strange creatures that could open shrouded canopies to trap plankton in the nutrient laden water.

Our stay with Art had been a very productive one despite the constant over-

cast and drizzling days that made up 80 percent of our time there. We now headed over to Barkley Sound, on the west side of Vancouver Island.

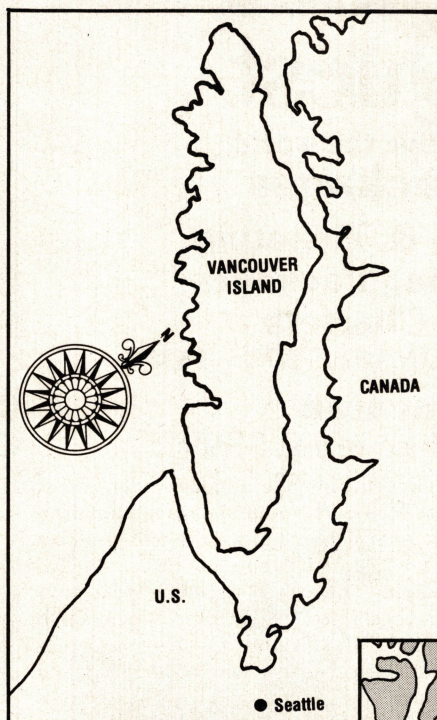
DIVING BARKLEY SOUND

The drive over is spectacularly beautiful. It takes about three hours and much of it is through winding mountain passes, timber groves and tumbling brooks that rush musically through narrow gorges. Our destination was unique. It was a 235 foot steamship-turned hotel called the *Canadian Princess*. Bob Wright, a wealthy Victorian businessman was determined to own a beautiful ship, so he purchased the *Princess* and made it into a 30 cabin hotel. For divers it's ideal. The atmosphere and charm of this old hydrographic ship lends an air of excitement to a diver's stay. A ramp leads down to a floating dock where four brand new 43 foot, \$250,000 custom designed cruisers wait. All sparkling clean and white, they are some of the most comfortable dive boats we have ever used — fast and stable.

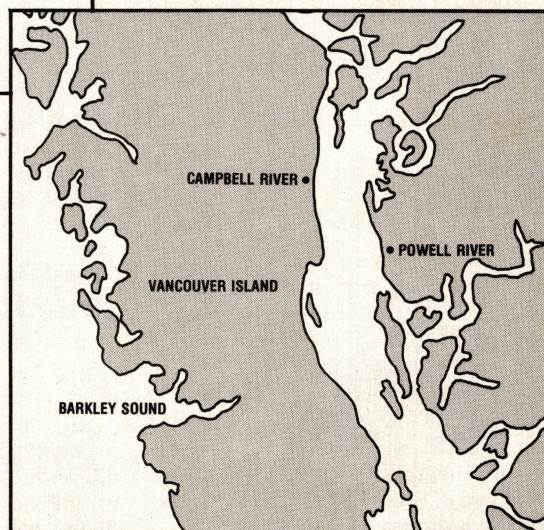
Ron McCaffrey, who looks like an ex-professional wrestler, was in charge of the dive operation. (As of this writing Ron had taken up employment elsewhere.) He and his assistant, Suzanne Page, were tireless workers and did everything from roust people in the morning, to underwater guiding and filling tanks. Having been a commercial diver, Ron was well versed in tending and it was a pleasure to have he and Suzanne constantly helping us in and out of our gear. When you are fully dressed with 35 pounds of weight and a tank it's a pleasure to have someone do a simple thing like pull the heel strap of your flipper on for you.

Vancouver's west coast is gorgeous! Hundreds of tree-topped, wind-swept islands of all configurations and sizes present divers with a diverse array of dive possibilities. Unfortunately, a storm had swept through a few days prior to our arrival and the water was murky. But, it gradually improved during our stay. As yet, I still had to get a good wolf-eel sequence in the can. A fish that grows up to seven and eight feet long, the wolf-eel is so ugly it actually seems cute. It has a set of powerful jaws with which it crushes shellfish and sea urchins. Ron found us a mated pair at Pumpkin Reef in about 30 feet of water.

Getting the female interested in feeding was relatively easy. It took a little patience on our part, but Ron finally enticed it out of the hole with some scallops. It took three dives before we were able to get the big male out. And, once he was out, we ended up swimming all over the reef after him. Out of exasperation, Ron finally grabbed him by the tail and put on



Above, Vancouver Island lies just off the West Coast of North America where the U.S. and Canada meet. Right, the British Columbia divers headquartered at Powell River, Campbell River and Barkley Sound.



the brakes. The wolf-eel didn't like that very much and turned back, jaws wide open, attempting to take a chunk out of him. Ron did a pretty fancy jig when the eel came within an inch of biting him in a very vulnerable area!

In the lovely Broken Islands we came upon a vast colony of seals and sea lions. There must have been 75 to 100 animals and a picture-perfect sand and rock cove. As we got close they set up a tremendous din, barking and yapping and jumping into the water. Ron believes that no one had ever dived here before. He told us that one diver was tossed a dozen feet in the air by a big male Steller in another rookery, however, it wasn't mating season, so I felt we could safely dive with them. Sari, Ron, Suzanne and I entered the water and it wasn't long before we were being buzzed by three or four seals. The water was very dirty and there seemed to be a halocline effect (the mix-

ing of fresh and salt water). This created a rippling effect so we swam to a large area where the water was undisturbed. We sat on the bottom and waited for the seals to come to us. On this first dive some of the big males were indeed slightly aggressive, and they stuck their big snouts right up to the camera lens. One of them buzzed me and gave my camera a good thump with his flipper. We constantly had to move because the animals stirred up the bottom so badly.

Peter and Carla Vassilopoulos joined us a couple of days later and when we dived with the sea lions again they were much more curious and not at all aggressive. One big female sat in front of me, rubbing her nose on the big dome of my camera, blowing bubbles and admiring herself in the reflection. I made the mistake of reaching out to touch her and she nipped at me. Peter was beside himself and later said it was one of the most in-

credible dives he had ever made. These animals are magnificent and waiting for them to emerge out of the ghostly emerald green was pretty exciting.

We dived on the *Thiepval*, a 150 ton Coast Guard vessel that ran aground while chasing a rum runner back in 1930. The hull of the vessel is mostly intact and hosts a stunning array of macro life and hundreds of giant white *Metridium*. I wanted more octopus footage, so we obtained a beautiful specimen from Les Tulloch, head collector of the Vancouver Aquarium, who happened to be in the area. We took the animal down to the wreck. Sari took the octopus out of the game bag so she could play with it in front of the camera. She was quite uneasy about handling a six foot octopus, but soon fell in love with the delicate creature and felt right at home with it. When the animal tired, it crawled around and

(Continued on Page 104)

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By Amy Brown

Tropic Bird

The remarkably fertile waters of the British Virgin Islands are a veritable sport diver's paradise. A fantasia of sealife exists beneath the surface. Nudibranchs glide effortlessly along on submarine winds, while through the eyes of our cameras, we discover the kaleidoscopic array of corals and sponges.

One of the most satisfying dive vacations that I have experienced in the B.V.I.s, is aboard the luxury motor yacht, Tropic Bird. Based in Tortola, the Tropic Bird offers accessibility to a multitude of dive sites, without sacrificing creature comforts. Even the most avid of divers will not be disappointed, with three or four dives a day and night dives, each evening.

Owner, Phil Clarkson, who has supervised numerous projects, world-wide, including the full length feature film, "Blue Water/White Death," has created a viable concept in dive vacations. He has superbly equipped the Tropic Bird for divers. There are spacious staterooms, hot and cold fresh water showers and baths, sauna room with Japanese tub, and spacious lounges and dining area. Air conditioning and stereo throughout are a couple of other mentionable amenities. A complete compressor system, including back up assures a maximum number of dives.

Captain, Mike Bloss, and the experienced crew, will guide you to some of the finest dive spots in the British Virgin Islands. A complimentary resort course is available, just in case you're bringing a non diver along. I'm convinced, that whether traveling with a group or individually, the Tropic Bird is the way to dive the Virgin Islands.

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Underwater Photography: Mark Lawrence

SDM travel SECTION

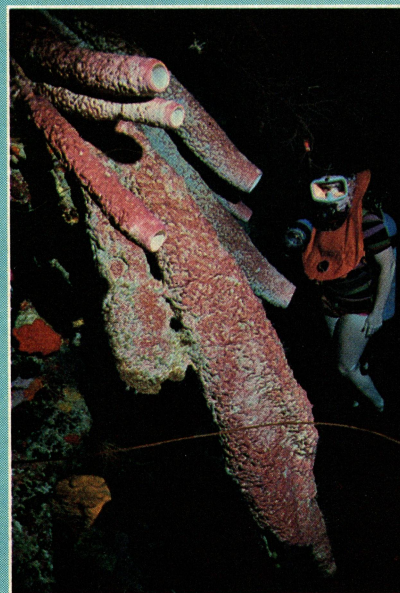
Belize is an anomaly for divers. It's a small, newly-independent country, bordering Mexico's Yucatan Peninsula. When you land at the airport in Belize City and drive through town to the seashore, you'd never know you were looking out at some of the Caribbean's finest diving. The water lapping at the dock is shallow and murky; to the east lies apparently open sea.

Ah, but that's the secret. Over the horizon of that seemingly-empty sea is the fabulous marine outpost known as Lighthouse Reef. Sixty miles from the mainland and still untouched by hotel builders and fishermen, it is one of the few places in the Caribbean where the fish life is just as it was 20 years ago.

Obviously, to get a full one week dive program at Lighthouse Reef (and its companion reef, Turneffe) we must use a live-aboard dive boat — a 120 mile roundtrip each day would be totally impractical. See & Sea Travel has found the best solution — the 75 foot dive cruiser *Isla Mia*. Captained by Henny Tromm, this phenomenal dive boat has nurtured a growing arm of serious divers who call it the best dive program in the Caribbean. It has comfortable accommodations, superb food (and all you can eat), and truly unlimited diving.

Why is the diving so highly-ranked? Frankly, many well-known Caribbean dive areas lost their populations of grouper, snapper, hogfish and barracuda to spearfishermen a generation ago. In these cases, easy access to the dive sites resulted in disaster; at many such areas one never sees a fish more than eight inches in length.

Belize's oceanic reefs are therefore a revelation. On every dive one will spot not just one but two or more big



groupers, so tame they'll sit and watch you take pictures. Every now and then a 5-20 pound hogfish will sweep by, or a barracuda will hover above you watchfully.

While the big fish are an incredible attraction, let's not forget the host of smaller fish and invertebrates that will grace your photo collection. Brilliantly colorful butterflyfish and angel-

Dive Belize on the Isla Mia

Text and photography by Carl Roessler

fish, saucy tangs, pesky damselfish, hamlets in a rainbow of colors, crinoids and sponges; all these and more are here for the picture-taking.

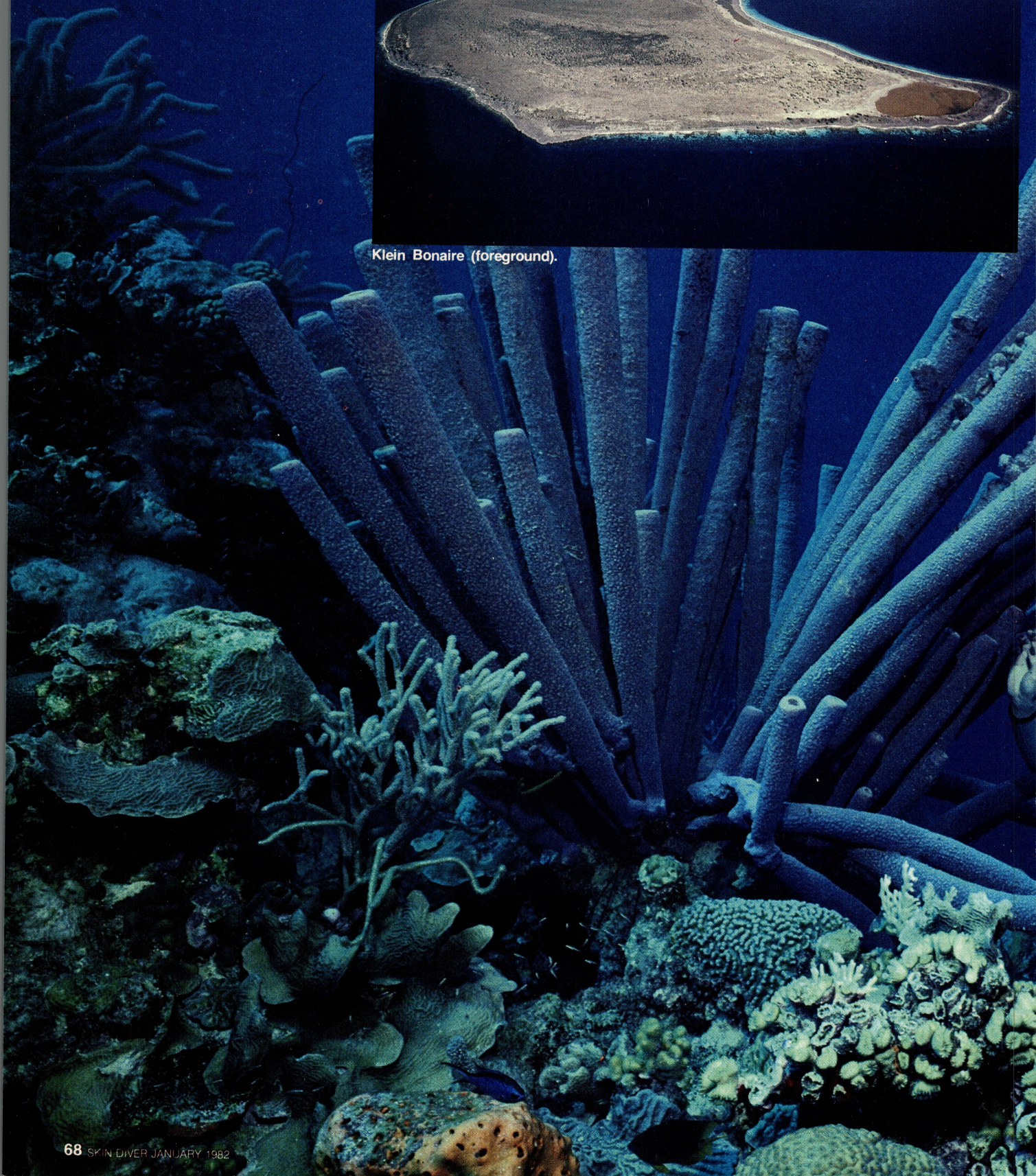
Depending on weather, Captain Tromm has literally dozens of dive sites to offer. Some are shallow coral gardens with short drop-offs, others precipices that plunge well beyond 500 foot depths. Still other spots have great pinnacles rising from the edge of the sheer walls to within 30 feet of the surface. This is definitely a trip to satisfy the avid diver and particularly the underwater photographer.

Throughout the one week and ten day cruises, divers enjoy a comfortable, clean and well-tended ship. Captain Henny, like all top shipmasters, is a fine mechanic.

Special group charter arrangements are available for family, club or dive shop groups of 8-11 divers. For complete information contact *Isla Mia's* exclusive U.S. agent, See & Sea Travel Service, Inc., at 680 Beach St., Suite 340, San Francisco, CA 94109; or call (415) 771-0077.



Klein Bonaire (foreground).





Coral formations at Jerry's Jam.

From the air it looks as flat and brown as a pancake on a hot griddle. The only inhabitants are lizards, iguanas and wild goats, although a few people once lived here. Of its total 1500 acres, three-fourths of the islet is a dismal plain with nothing but parched brush and withered cactus. For landlubbers, it is as hot and barren and featureless as can be imagined. But, for divers, Klein, or Little Bonaire, is a paradise found, one of the most important and interesting islets in all the Caribbean. Closer inspection from the air hints at the reasons.

The pancake islet is barely above sea level and is nestled into the curve of the boomerang-shaped main island of Bonaire only one-half mile away. A close look at the rugged shoreline reveals a hidden world of shore-hugging golden corals and turquoise shallows that quickly fades into a deep-indigo sea. The fringing reef is narrow, but a constant feature that neatly wraps around the islet like gold decoration around the face of an antique clock. Here is a zone of unmatched beauty and high adventure where more than a dozen established reef stations and hundreds of spectacular underwater sites are found.

Underwater, Klein Bonaire looks like a mesa — flat on the top, with steep sloping sides that drop quickly away from shore. The shallow reefs begin just below the surface and the intricate formations are known to be among the finest in all the Caribbean. The reef slope is a short distance away which means that the reef changes mood quickly and mixes reef critters with deep water inhabitants, providing a variety of scenery. Recently, a whale was spotted within a hundred feet of a moored dive boat and a half-dozen times last year our dive boat was escorted from Klein back to Big Bonaire by more than 100 bottlenose dolphins.

While whales and dolphins cannot be guaranteed, your first dive here will confirm the beauty and excitement. Pick a dive spot, it doesn't matter where. There are 14 permanent moorings placed by the dive operators and local conservationists to eliminate anchor damage. Each station offers more of the same along with something special that you won't find anywhere else. Here is a rundown of general underwater attractions at Klein divided into reef levels along with selected sites.

SHALLOW REEFS

The shallow reefs of Klein Bonaire are legendary and nearly without peer in the Caribbean. Outside the hurricane belt and protected from the trade winds by the main island, the shallow corals develop without heavy surge and form some of the most intricate shapes capable of each species. The huge platelets of fire coral are dominant just beneath the sur-

Klein Bonaire

A tiny
hidden paradise
offering a
lifetime of diving

Text and
photography
by Rick Frehsee

Opposite, one of the huge purple tube sponges found near Carl's Hill.



Photo: Bret Gilliam, V.I. Divers, Ltd.

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face with large stands of elkhorn and strong, toothy staghorn coral being the secondary formations. At the sides and bases of the shallow corals are clusters of orange cup corals which look brown in natural light but turn a fiery orange with a diver's handlight or the flash of a strobe. Colorful reef fish such as angels, goatfish, puddingwives, surgeonfish, parrots, tangs and triggers are easily found, along with the ever-present yellowtail snapper. Grouper, especially tiger grouper, can be seen, usually in caves and overhangs formed by the fingers of jutting coral. Small invertebrates such as pink-tipped anemones, banded coral shrimp, ruffled nudibranchs, arrow-crabs, decorator crabs and basket starfish are common. Even without heavy wave action, some surge may be present and will tend to push you into the fragile corals. Plan your movements so that you avoid damaging the reef. The best shallow reefs are found at Jerry's Jam, Lenora's, Knife and Sampler. Jerry's Jam features the most extensive shallow caves. Knife has some of the most interesting elkhorn, star and fire coral formations. Patch coral formations are common at No Name and Ebo's reef. Inside No Name is a nice white sand beach, a popular picnic spot.

MID REEF

As you move deeper, the lobular formations (head corals) dominate the scenery. The most important ones are the star, starlet, brain and lettuce corals which look like mammalian brains, lettuce fields or bundles of cauliflower all packed tightly together. The lettuce and starlet corals sometimes take on a layered or shingled effect and support tube and vase sponges in clusters or candleabra formations. A big attraction almost anywhere along the mid reef level at Klein are the tiger groupers at their cleaning stations. A few divers have carefully placed their hands at the station and had the small cleaner shrimp crawling over them in search of parasites. This is also the best level for general fish feeding with all species getting into the act. By far the most dominant and aggressive fish will be the "attack" yellowtails which will not hesitate to nip fingers or crawl into a feeding can or BC pocket. Good spots for general fish feeding are at Jerry's Jam, Carl's Hill, Valery's Hill and S.W. Corner. Knife and Sampler are also active sites. Best bet for fish feeding are bread scraps from the table. Watch out for the spotted moray eels if you are feeding meat, especially fish scraps. At several spots such as S.W. Corner and Sampler the spotted morays are aggressive enough to come entirely out of the reef and wrap around a diver, an exciting if not unnerving situation. The problem is that they do not see very well and may inflict damage upon the unknowing fish

feeder. Better to leave the eel feeding to the dive guides.

DEEP REEF

The deep reef is generally the most dramatic area. Here among the layered starlet and lettuce corals are the giant purple tube sponges, the azure vase sponges, the billowing orange elephant ear sponges and the fuzzy spiraling wire corals. Klein Bonaire has some of the best examples anywhere of purple tube sponges. South of Carl's Hill in 60 feet of water is one with 44 tubes which extend four to six feet out from the reef. Another "over 40" is at Twixt at 65 feet. Carl's Hill, Valery's Hill, MiDushi and Twixt all have their share of beautiful purple tube and azure vase sponges.

Orange elephant ear sponges are all around Klein at the second and third reef levels in formations that look like huge cushions, large hollowed bowls and modern chairs as well as elephant ears. Black coral is almost everywhere around Klein, from 50 to 90 feet, but it is particularly abundant and well developed at Forest. As with all corals it is protected by



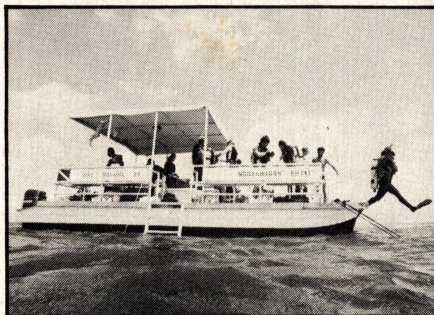
law in Bonaire, so look, but don't touch.

The deep reefs offer the best opportunities for seeing or taking pictures of large turtles, mackerel, kingfish, jack crevalle and the occasional barracuda. Streams of creole wrasse and blue chromis pass through the scenery continuously. For no apparent reason, sharks are rarely sighted anywhere at Klein Bonaire. Carl's Hill is one of the best examples of a vertical drop-off or mini-wall. Here, at the northwest corner of the island, is a straight drop in the reef from 30 to 80 feet, with numerous colorful sponge and coral formations along the way.

There are also impressive numbers of crinoids (featherstars) perched atop corals and sponges all along the reef slope. Whatever crinoids like is obviously in good supply in Bonaire. The reefs here seem to be central to the distribution of a number of Caribbean crinoids, including the common orange crinoid and the impressive black and white crinoid which look like those in Micronesia, Australia and the Red Sea.

The best bet for crinoid viewing and perhaps the most startling single formation in all of Klein Bonaire is at Ebo's reef. There, in 65 feet of water, is the magnificent "crinoid condominium," a mammoth orange elephant ear sponge capped with 12 to 14 black and white crinoids. The sight of this super sponge with its handsome plumage will take your breath away.

Here, in capsule form, is your guide to underwater discovery at Klein Bonaire. It is by no means complete, but it will introduce you to many "signatures" of Bonaire diving. A further testimony to my personal enthusiasm are the four underwater photo courses that I teach each year with Peter and Alice Hughes of Dive Bonaire. If this is your year to discover the marvels of the desert islet called Klein, I trust you will find that it takes but one dive to appreciate and a lifetime of diving to savor.



Dive Bonaire's flattop, *Moonshadow*.

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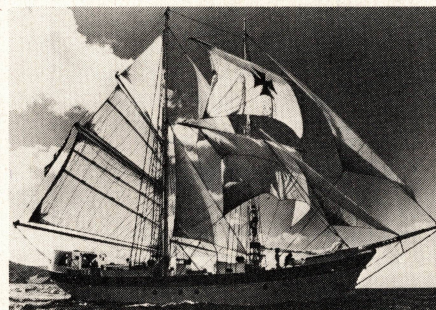
LA MER/COCOS ISLAND

La Mer Diving Seafari, Inc. of New York has a live-aboard dive program to Cocos Island, 300 miles west of Costa Rica, and 220 miles north of the Galapagos Islands.

Cocos is the world's largest uninhabited island (20 square miles). It is also a wildlife preserve, where animals have no fear of man. Several species of birds are indigenous to Cocos. The island contains over 200 dramatic waterfalls. Cocos has a fantastic pirate history. Legend has it that this was the site of Robert Louis Stevenson's Treasure Island.

Amos Nachoum, president of La Mer Diving Seafari, Inc., will be escorting the inaugural group, which will be departing on February 12 and returning on February 27.

This long-awaited exotic dive location will be reached aboard the *Taiyo*, a ma-



jestic 94 foot brigantine. This steel motor sailer is specially equipped for diving. It has a large compressor, 24 air tanks and six double occupancy cabins.

For further information please call or write to: La Mer Diving Seafari, Inc., 823 United Nations Plaza, Suite 810, New York, NY 10017; telephone (212) 599-0886/7.

HOTEL SIDNEY SCUBA SHOP

Hotel Sidney, a British Columbia dive resort, is opening Sidney Surf and Scuba. A division of White's Diving Equipment Ltd., Sidney Surf and Scuba will also provide windsurfing rentals.

Hotel Sidney is located on the waterfront in Sidney, BC.

SCUBA-AMERICA TRIPS

Scuba-America, Inc., of Dunmore, PA is offering dive tours to Bonaire and the Red Sea.

The Bonaire trip (Jan. 30-Feb. 6) is a full dive package including accommodations at the Hotel Bonaire. The Red Sea trip (Mar. 20-April 1) includes diving and a tour of ancient Egyptian ruins.

For information contact: Scuba-America, Inc., 600 East Drinker Street, Dunmore, PA 18512.

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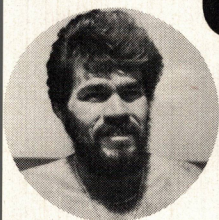
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PETER HUGHES'

DIVE BONAIRE



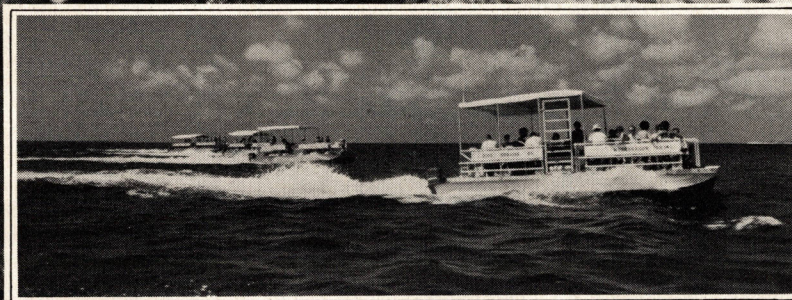
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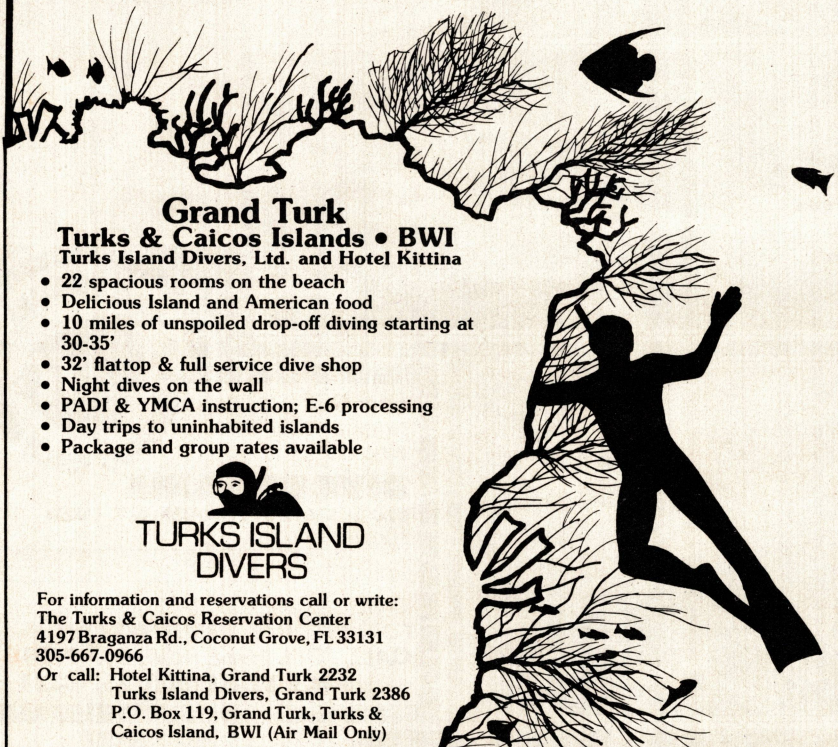
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Turks Island Divers, Grand Turk 2386
P.O. Box 119, Grand Turk, Turks & Caicos Island, BWI (Air Mail Only)



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NEW McKENNEY FILM

Jack McKenney has just completed post production work on his new underwater travel adventure film, *The Emerald Sea*.

U.S. Divers Co. sponsored the 30 minute film, which portrays a part of North America seldom filmed. Jack, his wife, Sari, and co-producer, Bob Abrams, were on location in British Columbia during the month of February diving out of Powell River and Campbell River in the Strait of Georgia, which separates Van-



couver Island from the mainland. The trio also headquartered at Ucluelet in Barkley Sound.

Diving out of the Beach Gardens Resort in Powell River with Jim Willoughby, the dive team filmed a stunning octopus sequence when they captured a seven to eight foot specimen. Giant Steller sea lions weighing upwards of half a ton and measuring eight to ten feet long were also filmed here.

Campbell River is the home of Delta's Discovery Inn. British Columbia has been compared to the Red Sea for its prolific and diverse invertebrate life, and Jack and his crew spent 10 days filming much of this rich undersea grazing land.

The crew traveled farther north to Telegraph Cove to film the bizarre hooded nudibranch along with other undersea life so colorful it easily rivals any warm tropical ocean.

From Ucluelet, out through the Broken Islands the divers filmed an exceptionally pretty shipwreck overgrown with plumose anemones. A tremendously large California sea lion colony and a pair of strange wolf-eels round out the film.

The 30 minute movie will be presented by Jack in his lecture series during 1982 and eventually used as part of a television series. For information regarding *The Emerald Sea* and the 1982 lecture series, write to Jack McKenney Film Enterprises, 1842 Micheltorena St., Los Angeles, California 90026.

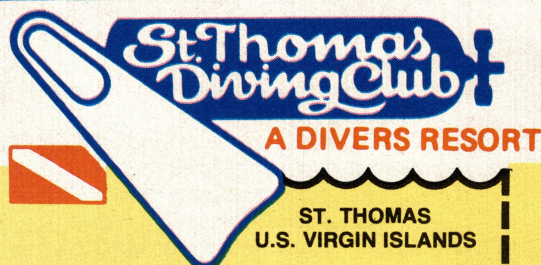
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TAN SAHSA, "The International Airlines of Honduras", Roatan dive packages: 7-Nights from \$479 per person, double occupancy plus air fare. CALL U.S. (800) 327-1225, FLA (800) 432-9818

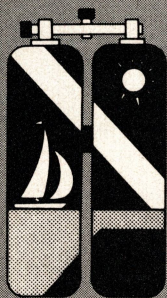
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BONAIRE SCUBA CENTER

Located at the Hotel Bonaire, on the lee side of the island, the Bonaire Scuba Center offers diving for all levels, including: snorkeling trips; resort courses; reef dives; boat trips; mini photo courses; night dives; and beach dives. Boats are available to qualified divers for search and exploration trips. Guides are provided as required, but experienced, competent divers are not restricted.

Bonaire, in the Netherlands Antilles, has a lot to offer on land as well as underwater. The island is well out of the hurricane belt, with year-round sun and an average temperature of 82°F.

The Hotel Bonaire, the largest on the island, has air-conditioned rooms and extensive facilities for entertainment, recreation and shopping.

For more information contact: Bonaire Scuba Center, Hotel Bonaire, Bonaire, NA; U.S. telephone (201) 566-8866.

BURNS TO DIVE BONAIRE

Craig Burns has been appointed manager of the dive shop at Dive Bonaire, in the Netherlands Antilles.

Craig brings a wealth of experience and expertise to Dive Bonaire, which is a full-service facility at the Flamingo Beach Hotel. The shop features equipment for sale or rental and has a staff of 12 divemasters to accommodate large and small groups or individual divers.

Craig's professional career started with a post as training director at a leading scuba center. In 1978 he served as official resort guide for UNEXSO (Underwater Explorers Society) in Freeport, Bahamas and established the dive operations at Treasure Cay in 1979.

LA MER/GALAPAGOS

La Mer Diving Seafari, Inc., of New York has a new, live-aboard dive program to the Galapagos Islands, 600 miles west of Ecuador.

Amos Nachoum, president of La Mer Diving Seafari, Inc., will escort the group personally. The group is scheduled to depart on March 15 and return March 30.

The program features 14 days of diving and land exploration, with a group of six participants.

To ensure maximum accessibility, La Mer will use a 40 foot motor yacht, which will enable the group to reach the islands of Isabella, Fernandina, Santa Cruz, James, Tower and others. The land and underwater exploration will be conducted by a local naturalist expert.

For further information please call or write to: La Mer Diving Seafari, Inc., 823 United Nations Plaza, Suite 810, New York, NY 10017; telephone (212) 599-0886/7.

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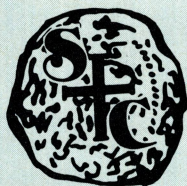
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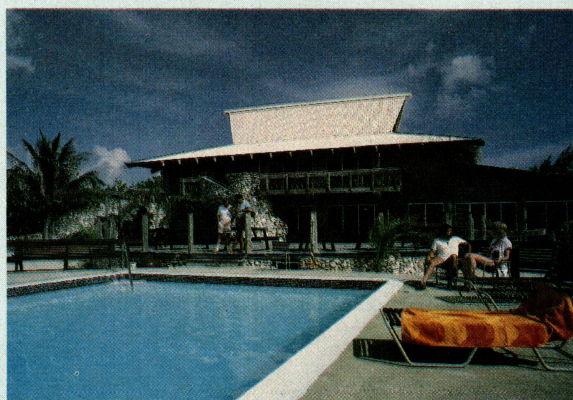


Photo: Nancy Sefton

Spanish Cove

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SAIL BELIZE

Sail Belize, Inc., has begun operation of a bareboat and crewed charter fleet based at a new marina development on Moho Caye, one-quarter mile north of Belize City, Belize, Central America. Dave Gegg, a citizen of the newly independent nation, will manage the fleet of Irwin 37's and Wings 33's. Fleet expansion plans include dive/fish equipped Irwin 52's and a new cruising version of the Stiletto catamaran. Scuba diving and fishing gear are available.

Gegg formerly managed the Fleet Indigo franchise in the locally owned marina and recreational complex development. The new company will honor all charters scheduled with Fleet Indigo before that office was closed, and the group is attempting to settle any unresolved charter claims with Fleet Indigo from past charters in Belize.

Reservations are being handled by a new Sail Belize office in St. Petersburg, Florida; phone (800) 237-6339, or in Florida and Canada, call collect (813) 821-0647. The address is P.O. Box 13023, St. Petersburg, FL 33733.

Three international airlines, including Air Florida, service Belize daily from Miami, New Orleans and Houston.

QUIESCENCE BOAT

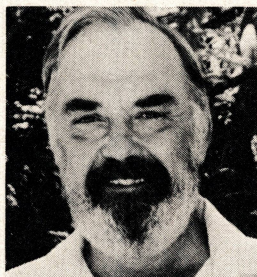
Quiescence Diving Services, Key Largo, now has a third boat, the *Quiescence III*. This 25 foot, six passenger boat increases Quiescence's capacity for groups of up to 18 divers. Quiescence still offers personalized charters, limiting the number of passengers on each boat to six.

For more information call (305) 451-2440 or write P.O. Box N-13, Key Largo, FL 33037.

CLAYPOOL TO CAYMAN KAI RESORT

John Claypool has been named manager at Cayman Kai Resort, Grand Cayman.

Cayman Kai has 26 one and two bedroom sea lodges with fully equipped



kitchens and 13 privately-owned villas with from one to four bedrooms. The resort features all manner of water sports

on over 200 acres of beachfront including: swimming, snorkeling, bottom and deep-sea fishing, scuba diving, boating, and water skiing.

Claypool takes over at Cayman Kai after a career with the United States Navy, and several years managing restaurants and country clubs in the USA. He has announced several development programs for Cayman Kai including the building of new kitchen and dining areas and expansion of water sports facilities.

For more information, contact the Cayman Islands Department of Tourism: (305) 444-6551; 250 Catalonia Ave., Suite 604, Coral Gables, FL. Also, there are regional offices in Chicago, Houston, New York, Los Angeles and Toronto.

BUCKEYE BALL

This year's Ohio Council of Skin and Scuba Divers, Inc. annual Awards Banquet and Ball will be held at the Sheraton Inn-North, February 5-7. Just west of I-71 on State Rt. #161, the banquet is being hosted by the Buckeye Divers.

The banquet and ball price includes the following: buffet style meal and dance on Saturday night, the Saturday afternoon film show, Friday night swim, all hotel facilities, and admission to all displays and contests.

For prices, application form and more information, contact: Buckeye Divers Banquet Comm., Ken Davis #5, 1366 Briarcliff Rd., Reynoldsburg, OH 43068.

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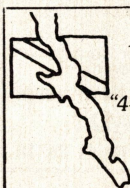
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EXOTICO DIVERS

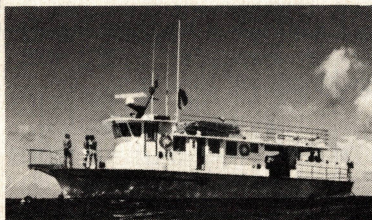
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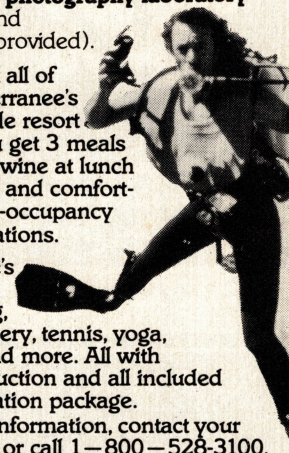
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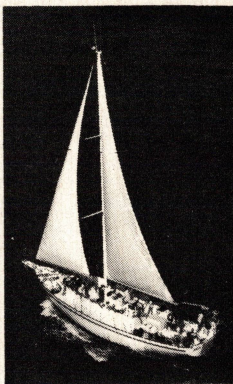
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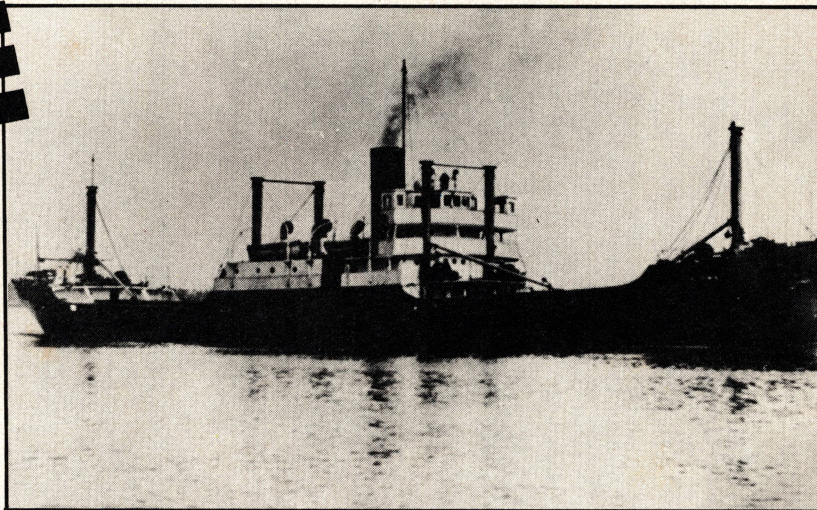
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Lake Superior Has A Wreck For All Seasons

By Todd S. Parkhurst

“So you want to dive wrecks in Lake Superior, eh?” says our host. “What kind of wrecks do you want to dive?”

What kind of wrecks? What sort of question is that? Our dive group has just arrived at Captain Tom Bathey's dive resort, Venture North, near the small town of Munising, on the Upper Peninsula of Michigan. We're unfamiliar with this area; other dive locations usually have a single wreck, or perhaps two or three. But Tom makes this wreck div-

ing trip sound like an excursion to a supermarket.

“What kind of wrecks do you have?” I asked.

“We got all kinds — old, new, wooden, steel, sail, steam, big and little,” grins Tom.

I decide to see if he's serious. “We'll take one of each.”

“OK,” he cautions, “but there's more wrecks within cruising distance of the Munising town dock than you can dive in just a couple days.”

Now it's our turn to grin. “We'd better get started, then!”

In a few minutes, we're aboard the *Baywolf*, the queen of Tom's two ship dive boat fleet. As Tom backs out of the slip, we carefully ignore the stares of tourists on the pier. These less venture-some sorts are here to board a pleasure boat for a sightseeing ride along the Pictured Rocks National Seashore.

Soon we're splashing past Miner's Castle Rock (point of interest number 7a on the tour) which eons of wind and water

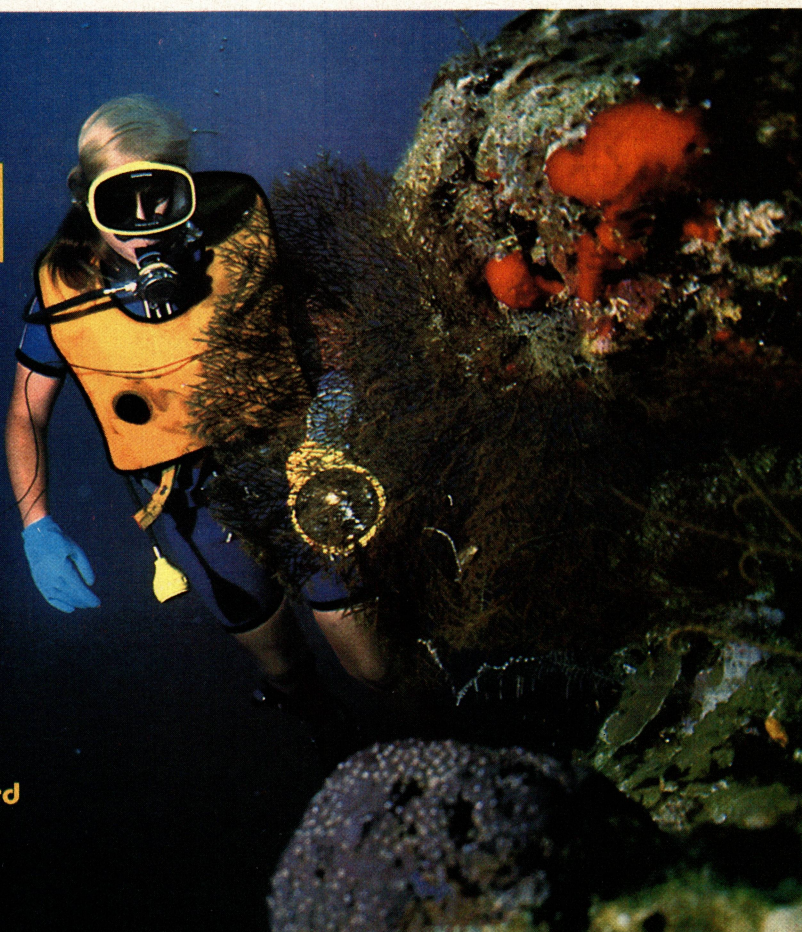
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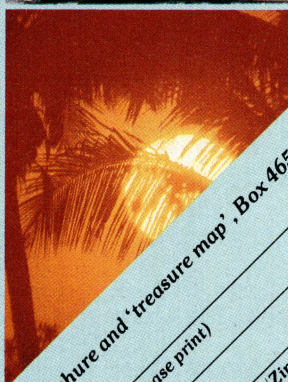
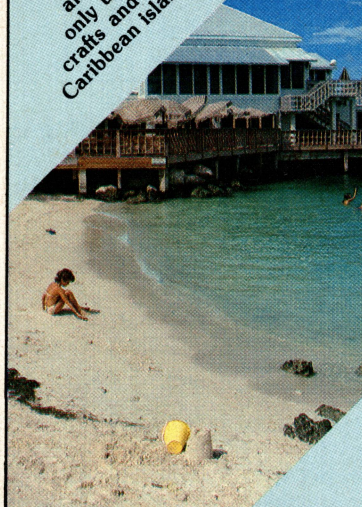
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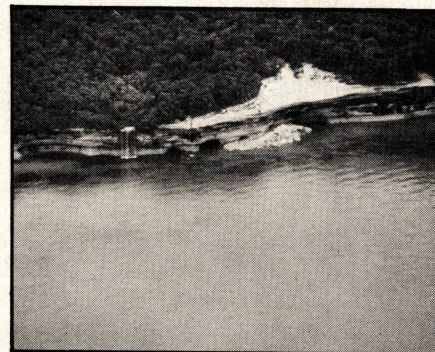


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have carved from the 100 foot sandstone cliffs. Overhead, gulls circle, seeking a potato chip handout. Beethoven's Fifth Symphony jumps from the boat's small stereo system.

Tom shouts, "Five minutes!" as we near the first dive site and we suit up. His timing is good; just as we finish dressing and are beginning to get overheated, Tom throttles back and drops his anchor directly on the wreck of the *Kiowa*.

We enter the water and start down the anchor line. All around us, the vast shape of the *Kiowa's* hull takes form. Electric motors the size of barrels and steel cables an inch thick litter her twisted deck. Her up-ended bow is separated by a few



The *Smith Moore* (here reproduced from an old woodcut) was lost on July 13, 1889.

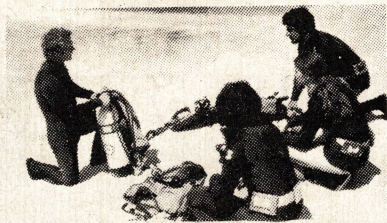
feet of sandy bottom from the midship portion, and points like a steel Gibraltar toward the lake surface. Here and there, brass fittings sparkle. They've been polished by a half-century of water and sand to a shine brighter than new.

We pull ourselves along a jumble of giant steel hull plates, and sunlight streaming through empty rivet holes provides a leopard-spot pattern on a diver in front of us. A number of these hull plates have become loosened, leaving a pattern of black holes against the gray-green hull and brown-green sand.

As we pass one of these voids, there is an explosion. From the hull, dozens — scores — hundreds of silver torpedoes pour toward us, deftly dart over, under, around us, and reform as a swirling mass beyond. Miraculously, none touch us. Before our startled eyes, the frenetic activity slows, revealing a huge school of sturgeon. Soon the schooling motion stops and we are the objects of the stares of hundreds of unblinking eyes, all just out of arm's reach. Instinctively, the sturgeon have realized that we cannot capture them. Soon the school turns and flows away over the *Kiowa*. When we fall behind, the school stops. When we catch up, it moves on. We are led on a dream-like tour, past portholes and pots, past boiler plates and deck plates, past small steel rubbish and the huge steel rudder. Suddenly the school turns and, with a synchronous flick of its collective tail, is gone, vanished into the haze beyond our vision.

We check our air supply. It's low. For-

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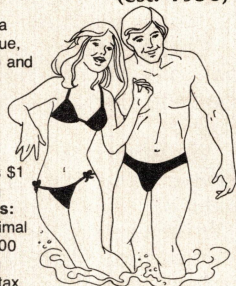
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tunately the dive boat anchor line is nearby, delicate and new in contrast to the huge antique cable coils. We gently haul ourselves up and away from the *Kiowa*.

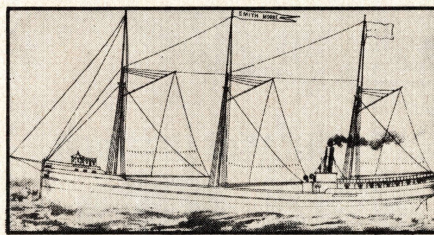
As the divers begin to climb back into the *Baywolf*, someone asks, "How did the *Kiowa* get there?"

"Listen," says Tom, "There are so many screw-ups over that wreck nobody can tell you the true story for sure, but the way I've heard it is this.

"She was a World War I Liberty Ship, later bought for laker service. She was downbound from Duluth to Chicago, loaded with linseed oil, when a blizzard hit on December 1, 1929. Near here, the captain and four crewmen jumped ship in the only available lifeboat, leaving the rest of the crew aboard. The lifeboat cap-sized and they drowned — served 'em right. For the next two days, the *Kiowa* drifted, with the first mate blowing the whistle, and the ship a derelict, banging around on the rock reef. Every time a tug went out to hook on, the storm came up again. Finally, someone got the rest of the crew off, and about a week later, she gave up and sank.

"When she sank, the linseed cargo got loose. Linseed is almost pure protein, I guess, and the fish loved it. For years this point was the best fishing bank for miles around. The fish could be caught easy, but they all tasted like they'd been pickled in paint thinner."

Now unburdened of that secret, our boat skims toward the next dive spot. "This one's gonna be the *Superior*," says Tom. "She's a lot older — sank in 1856. She looked like most early steamboats, with big paddle wheels amidships, and a pointed prow. I've got copies of an article



The *Smith Moore* (here reproduced from an old woodcut) was lost on July 13, 1889.

about the wreck in that chest over there — pass 'em out to everyone."

The article is in the form of a letter from a Joseph W. Denis, one of the passengers, which was printed in the New York Times on November 26, 1856:

"We left the *Saut* on the morning of Wednesday, the 29th of October, weather being favorable until toward night, when it commenced blowing from the northwest, raising a heavy sea. The boat rode very well until 11½ o'clock pm, when she carried away her rudder, and immediately came around in the trough of the sea. The first sea that struck her afterward carried away her smokepipes, throwing her freight and cattle down to leeward. Hands were called to man the

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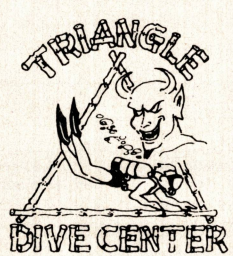


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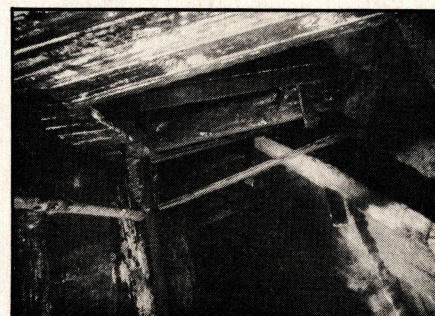
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pumps, but these were so small as to be of little avail. By 12 o'clock the water had entirely extinguished the fire in her furnaces, the engine stopped, and all hopes of saving her were given up. . .

"At half-past one a cry was heard of 'Rocks! Rocks!' This brought all to their feet, and a rush was made for the boats, there being only two which could be got at.

"I jumped overboard, anticipating the



Inside the **Smith Moore**, the original paint still adorns the walls after 92 years U/W.

time of her breaking up, as I saw she must very soon go to pieces. The first sea threw me nearly to the rocks, but its return carried me back. I turned around to look at the wreck, but the roar of the surf was so terrific as to prevent my hearing anything of the cries of the sufferers. The next sea came down upon me with a heavy load of timbers from the wreck, knocking me senseless. When I recovered I found myself lying on my face on the rocks, with a heavy pile of driftwood upon me.

"Hearing voices beyond me, I crawled toward them, and found a number huddled together under the shelving rocks. The place where we cast was not earth, but was formed of fragments of rocks that had fallen from those that projected over. We shivered out the night, suffering intensely with the cold, and anxiously looking for daylight. All our efforts for fire proved unavailing. At daylight we discovered that her wheels were left where she struck, about 200 feet from where we were, and projecting out of the water about 10 feet. On one wheel five persons were clinging — on the other, two — still alive, every sea breaking entirely over them. They called to us for help, but it was of no avail; the sea running so high as to render it impossible, even had we the means within our reach.

"One by one we saw them, poor fellows, drop off, benumbed with cold, and unable to cling longer to this, their forlorn hope.

"We were now 18 in number . . . the number of the lost I should compute at about 42."

While we were reading, Tom reached our dive spot. The Lake Superior shore is perfectly straight along here, the cliffs reaching down directly into the water. We enter not a cove, really, but no more than a slight recess in the cliffline. To the left, a

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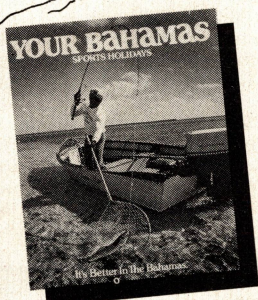
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waterfall spills over cliffs smeared a blood red by iron and copper deposits. Nearby is the indented "place not of earth" which received Denis and the others on that horrific night a century and a quarter ago. The water is dead flat as we slip in.

Visibility here is good, and the water is only 7 to 15 feet deep. Wheels, chains, shafts, supports, plates, rivets and tubes are spread over a rocky, sandy area the size of a football field.

We quickly locate a bundle of tubes which were once the *Superior's* boilers. Here have been found gold coins, tools and other items on recent dives. We set to work fanning the sand beneath the boilers with a one-way motion, and soon are rewarded with a small button. We wonder where it was on that October night. In another spot is the small silhouette of a terrier dog, cast in iron atop a nail head as a decoration.

At this depth, our air supply will last for hours, but in little more than 40 minutes, we begin to notice that we are beginning to drop things, and that our attention is wandering. The effects of cold are beginning to make themselves felt. We head for the surface, and home.

After a good night's sleep at the Venture North headquarters, Tom suggests diving the *Smith Moore*, one of the most famous shipwrecks in Lake Superior.

On July 14, 1889 the *M.M. Drake* steamed into the Munising harbor, towing the *Smith Moore* and carrying her crew. Apparently the *Moore* had been the victim of a fog-shrouded collision in the open lake with a third ship. As the wounded *Moore* and her rescuer made their way across the Munising harbor, the *Drake* cut the tow line. Five minutes later, the 223 foot *Smith Moore* sank like a stone in 130 feet of water, carrying her whisky, iron ore and silver ore to the bottom.

This will be a deep dive, and Tom discourages inexperienced divers from trying it. When the *Baywolf* reaches the buoy marking the wreck, we jump in, and start down. The buoy anchor line seems to stretch down to infinity. Around us the water grows darker. Suddenly, just as we penetrate a thermocline, the *Smith Moore* looms out of the gloom. At this depth, she's never been touched by ice, storm, wind or weather. She is intact. She is almost perfect. Her 90 year old paint still proclaims her name above her massive rudder. Her 16 foot propellers rest in the dim sand below. Ornatly worked deck rails lead to her silent engines. Steam pipes the size of sewer mains lead down into yawning black holes. As we work to the forward end, we find the *Smith Moore's* bow gone — mute evidence of that foggy collision 90 years ago.

An open door in a forward cabin beckons. We shine our light inside. A sink, still bearing a stopper, stands in a corner adjacent a closet. On the opposite wall is a bunk. The cabin is ready to be furnished

and used at once. Perhaps the occupant has stopped to discuss the Grover Cleveland-Benjamin Harrison election, and will be along shortly.

The depth and cold have quickly consumed our air supply. We scoot along the deck, and find the anchor line reaching like God's rope to heaven. Up we go, glad to get back to the 40°F warmth above the thermocline.

As we ascend, exhaustion grips us. When we break the surface, Tom must help us back on the boat. We are barely able to strip off gear, towel off and change into dry clothes as we head for home.

Tom's boat drags herself into the slip, seemingly as tired as we are. No wonder — it's nearly 8 pm, but the summer sun is still high in the sky this far north. There's still time for a big steak before we depart.

Over dinner, we remark to Tom on the variety of wreck diving adventures he's just provided. His eyes twinkle. "C'mon back!" he says. "There's lots more — at least three more in the harbor, and on the shore — I haven't found 'em all yet!"

ANOTHER BATCHELDER AT SAN SAL

Danny Batchelder has joined the dive-master staff at the Riding Rock Inn, San Salvador Island, Bahamas. Danny, age 24, is the eldest son of Dick Batchelder, president of Columbus Landings Service Co., and has been involved in diving for most of his life.

Danny received his instructor certification at age 18. He managed the family



photo/Geri Murphy

dive shop during his teens and then moved to San Salvador in the Bahamas for a short period of time. While there he served as a divemaster and scuba instructor at the Riding Rock Inn as well as assisting Paul Tzimoulis in his school of underwater photography.

Danny left San Sal to participate in the salvage of the 300 year old Spanish galleon, *Concepcion*. Then, he served as head divemaster and scuba instructor for Spanish Bay Reef resort on Grand Cayman. He also assisted Jim and Cathy Church in their school of underwater photography.

Danny is currently a representative for Columbus Landings Service Co., the stateside sales and service agency for the Riding Rock Inn. He also serves as assistant instructor for the advanced underwater photography courses conducted at San Salvador Island.

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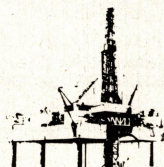
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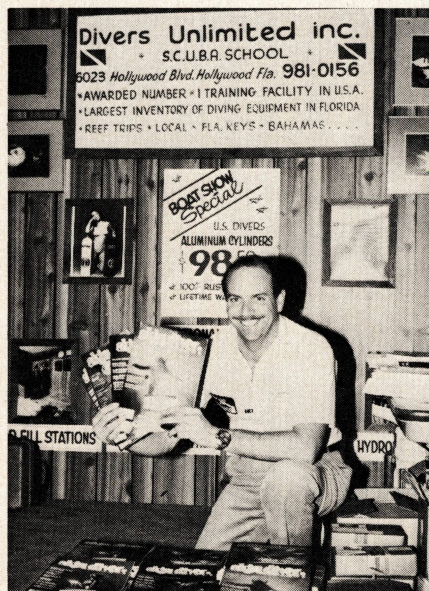
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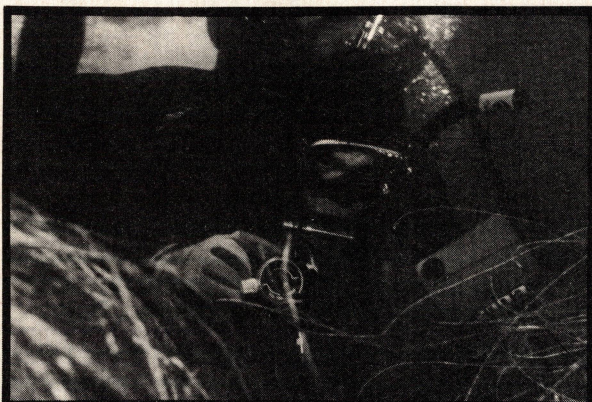
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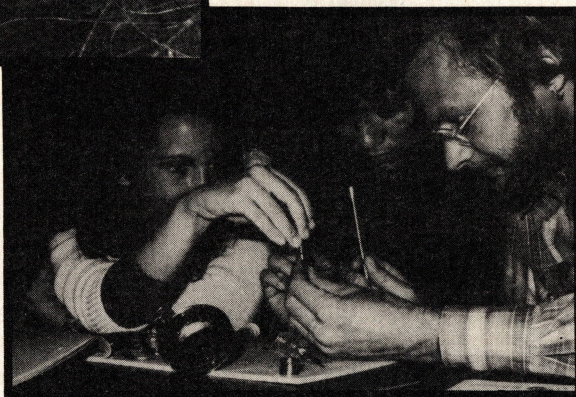
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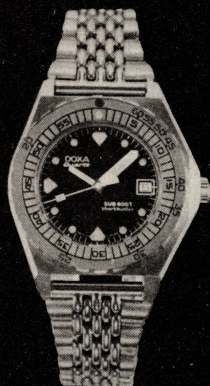
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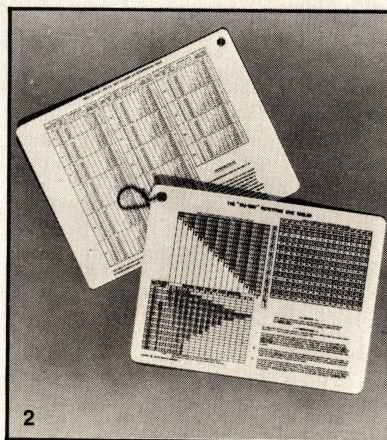
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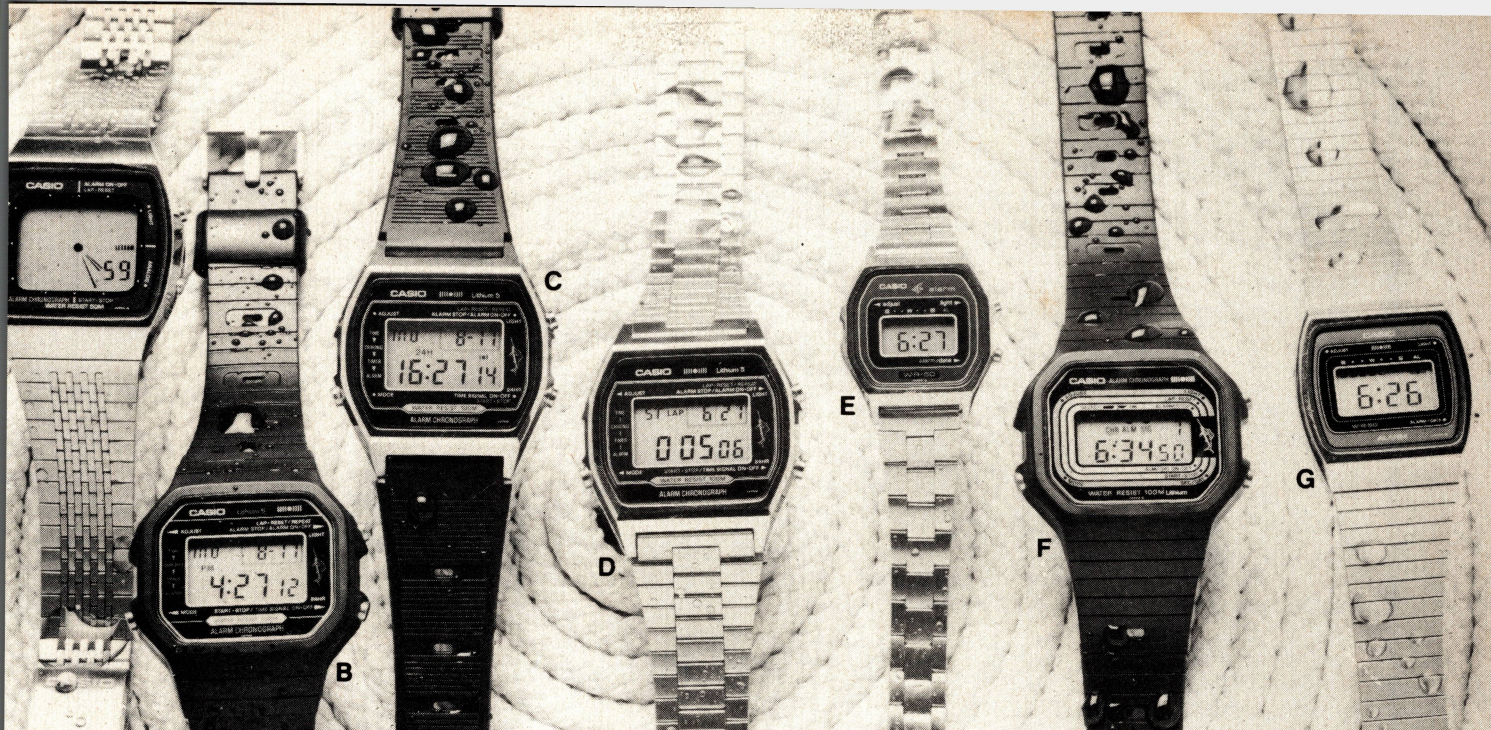
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2

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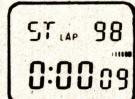
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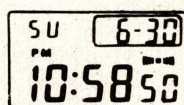
DIGITAL READOUT



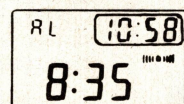
STOPWATCH



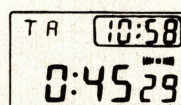
COUNTDOWN ALARM



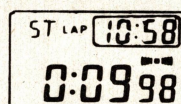
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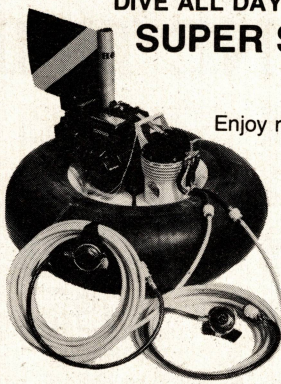


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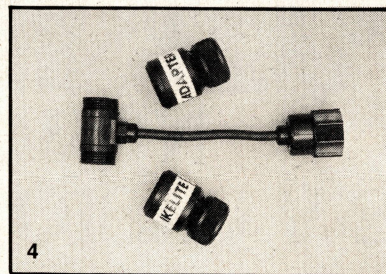
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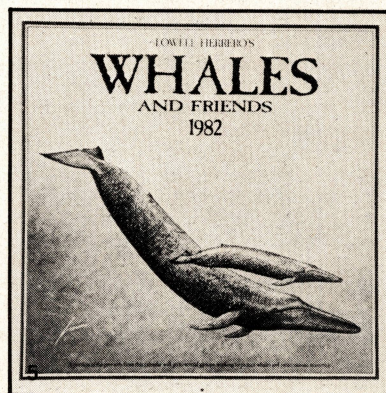
NEW GEAR



3



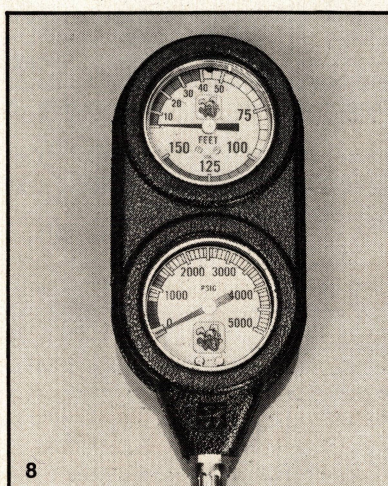
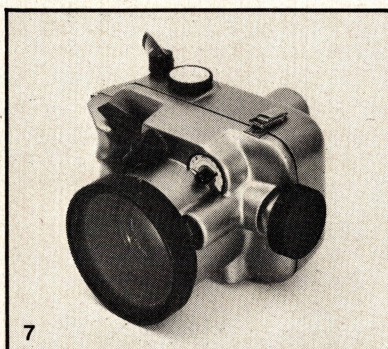
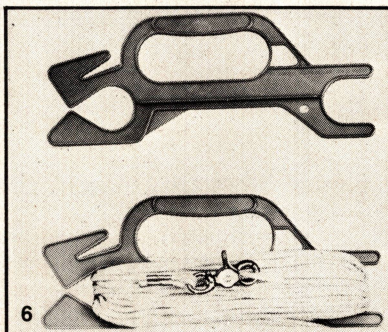
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3 Pewter Figure—Designed by diving artist, Les Hunter, this handcrafted, pewter piece will add a nice decorator touch to the home or office. The diver is 4½ inches long and a shark measures 4x4 inches. The diver is \$10 and the shark is \$8. From Sea Stuff, P.O. Box 8633, Fort Lauderdale, Florida 33310.

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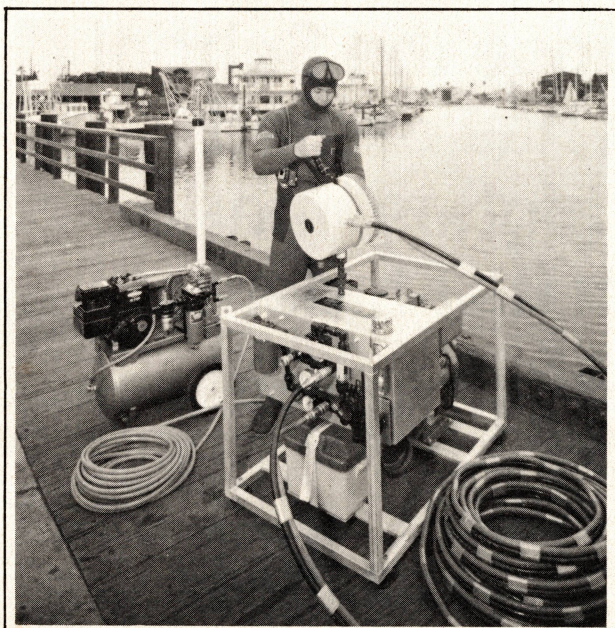


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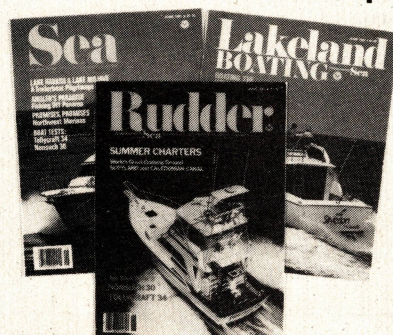
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CLAM POACHERS

(Continued from Page 35)

in the water so we could witness how they actually worked.

Now I was anchored in the Laughlan Islands off the eastern extremity of Papua New Guinea. It is a coral atoll ring of several islands and one of those extremely rare unspoiled Pacific paradises. I had been here for a month filming the happy, contented people for a TV special entitled, *The Island that Time Forgot*.

I had been diving on a reef ten miles away that day. When we ran *Beva* back through the pass into the lagoon, we were surprised to see a junk riding at anchor, with our native friends swarming



photo/Lynn Cropp

Patrol boats are few and they must cover an enormous area of poorly charted reef.

over it. I dropped *Beva's* anchor alongside the *Sing Hung Ih*, expecting the junk to up anchor and run.

The native girls waved to us, and the Taiwanese waved, too. We were friends of the natives, as were the Taiwanese, and they took this as a bond of friendship between us. But, for us there were strong undercurrents. We had come from the Great Barrier Reef and witnessed the enormous damage done by Taiwanese divers. We also knew what ecological damage the Laughlan reefs would suffer and these reefs provided substance and survival to the islanders.

The Laughlan islanders believe that Taiwanese sailors were their ancestors, and therefore they are welcome and can do no wrong. They bring many gifts of essential goods, too: tobacco, knives, fish hooks and cloth. These items from the outside world are treasured as they are rarely seen.

It was difficult for me to explain to the islanders the parallel of what the Taiwanese have already done to Australia's Great Barrier Reef. The Taiwanese have been coming to our reefs for many years. I have dived the entire length of the Barrier Reef. In the northern end especially, I have swum along reefs absolutely littered with dead clam shells — hardly a live one remains. I can tell it has been many years since that reef was raped, for the corals almost hide the scars. I have dived too, on reefs where every clam is but a wide open white shell — the clam poachers had been there just a week before.

The highly prized clam meat brings \$15 a kilogram to the poachers back in Taipei, and is then marketed in Hong Kong at up to \$44 a kilogram. On an average trip down to our reef, a junk will profit well over \$100,000 and expenses are not high.

It is estimated that some 20 junks raid our reefs every year. They can load up to 15 tons of clam meat each, representing a killing of 60,000 clams per full boat. Start multiplying and the number of dead clams runs to over a million every year.

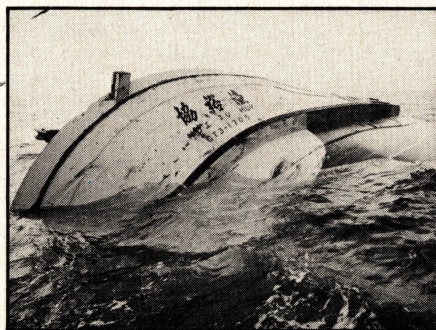
Since 1969, only 24 of these illegal clam boats have been caught, representing about ten percent of those operating here. Australia's Coastal Surveillance has now stepped up its operations and both captures and fines have increased. Jailing is now mandatory.

I went onboard the *Sing Hung Ih* at the Laughlan Islands in an attempt to find out more about these unscrupulous poachers and the way they operate. They proved to be most friendly and courteous. They were not roughnecks as I expected. Instead, I met clean-cut youths in top physical shape with happy dispositions. Some were well educated and one was a school teacher who had left his job to earn his fortune. None could speak English. All my information was obtained by sign language and a mutual understanding of boats and the sea. Of course I remained biased, anti-poaching. I ascertained that the Taiwanese knew it was

illegal, but did not really believe it was wrong.

They showed me the charts they carried and I opened up quite a detailed one on the Great Barrier Reef. I shook my finger and said "no." I mimed a policeman and handcuffed the skipper. They all laughed and acknowledged with nods that they would not go there.

As we talked and gestured on deck, an inconspicuous looking boat slipped into



A wrecked Taiwanese junk. The poachers use old boats worth less than one trip's profits.

the lagoon and dropped anchor. The Laughlan Islands, which rarely see visitors, were becoming cluttered. I recognized the boat as a PNG (Papua New Guinea) Government Fisheries vessel. They were here to teach the islanders how to gather and prepare beche-de-mer (sea cucumbers) for market. Worried eyes swung to the new arrival then turned

to me for confirmation.

I mimed it was a fishing boat — it wasn't a lie. But I knew the PNG vessel would radio for a patrol boat. I had little time left to follow and film the poaching activities.

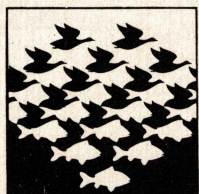
Seven divers worked from the one dory. The junk skipper handled the tiller and steered it toward the reef. The divers sat and sharpened their clam tools, spat and rinsed masks and slipped flippers on. String bags were attached to their belts. Their dive suits were bright red or blue form-fitting track suits — for protection against the coral.

When the dory motor chugged to a stop, a rush of bodies hit the water and swam madly off. Speed and competition was the order of the day. I filmed all this from my dinghy alongside. Now Lynn and I took underwater cameras and slipped in to join them.

It was exhausting trying to keep up with the poachers. I've never seen divers flip so fast. It was a race to the clams all the way.

I spotted one diver ahead of me. He had stopped and was hovering above a clam, breathing deeply for a downward plunge. He saw me coming, waved me over and waited. Now I could capture on film the complete act.

The giant clam was still partly open. Two deft strokes with the tool severed both sides of the muscle. The hand plunged inside and the clean waters over



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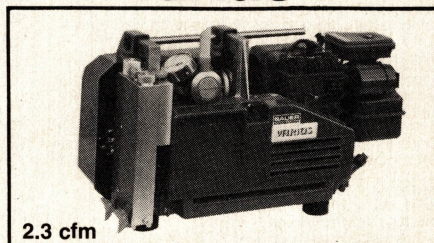
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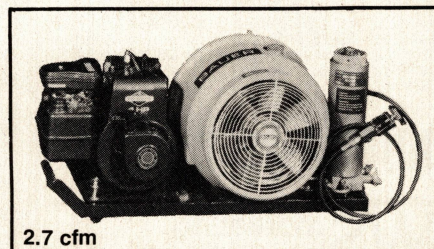
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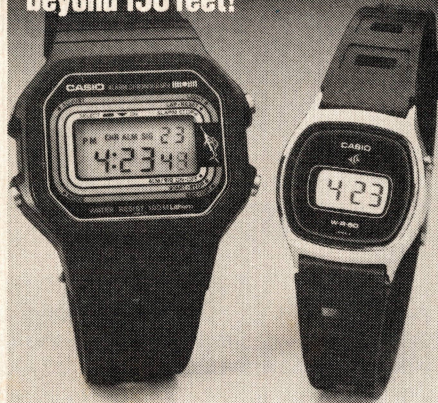


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CLAM POACHERS

the reef clouded with blood as the muscle was torn free.

It seemed incongruous for Lynn and I to be here filming the very act we abhorred. But we were powerless to stop them. We were only visitors in a foreign country.

On that day the seven divers killed 500 giant clams. They worked for three days and an estimated 1500 clams became gaping monuments to their greed. Every turtle was captured, too.

On the third afternoon, the dory suddenly picked up all the divers and chugged back to the junk. I ran our dinghy alongside and questioned the sudden end to their dive. The divers laughed and pointed crooked fingers, calling out "bang, bang!" They pointed west. It was very obvious the patrol boat was on its way. But only the skipper seemed really worried.

Their departure was rapid. As the anchor came up, the native girls jumped over the side and climbed into their ca-



Lynn Cropp holds a clam poacher's tool in front of a wrecked junk at Saumarez Reef.

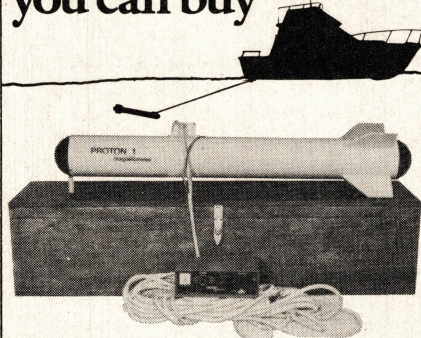
noes. I found out later one of the girls had warned the Taiwanese that the fisheries vessel had alerted the PNG navy.

There was much waving and cries of "bye-bye" as the ungainly junk slipped out of the lagoon. She was listing a little to port and slowly swung south toward the open sea. That was the last we ever saw or heard of her. Perhaps she will one day be captured in Australia, but hopefully I succeeded in warning the crew to stay clear! All I know is that in the past year she has not been sighted on our reef.

Scientists have not been able to accurately estimate the extent of damage to our Great Barrier Reef. They all agree that the removal of large numbers of clams must have an effect on the reef's ecological system. The role of the giant clam *Tridacna gigas* is not fully understood and research has been limited.

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should be a population of 17 million clams. But the Taiwanese have been poaching up to a million clams a year since 1958 and that should mean all the clams are gone. Total estimates are never accurate and there are giant clams still alive on our reefs — but not many. Most of these are on reefs close to major ports where the poachers would not dare to intrude.

On my last film trip along the reefs from Cooktown to Cape York, my crewman Wally Gibbins made a discovery which can only spell disaster for the clam population. Wally is Australia's top shell expert. He searched this long stretch of reef for juvenile giant clams — and failed to find even one. We saw thousands of dead shells and only a few dozen live specimens.

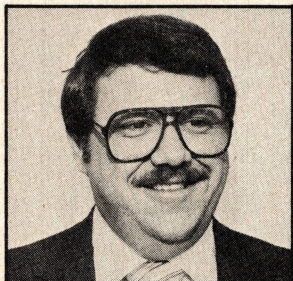
A large clam may produce as many as 10 million eggs a year, so it would first appear that any loss could soon be made good. This is not so. From all those eggs perhaps only one will reach adult life. It takes 10 years for a clam to grow as big as a half meter across, and perhaps another 90 years to reach full size.

The Taiwanese poachers have undoubtedly spoiled parts of Australia's Barrier Reef, and perhaps will cause the extinction of the giant clam.

For the Laughlan islanders, the poachers' presence was a tragedy. There are no live clams left on their reefs, and no turtles swimming in the clear lagoon. It's the beginning of a paradise lost.

STEWART JOINS PADI HEADQUARTERS

John Stewart has joined the PADI Headquarters staff. John functions as international operations manager, and his duties include coordinating international



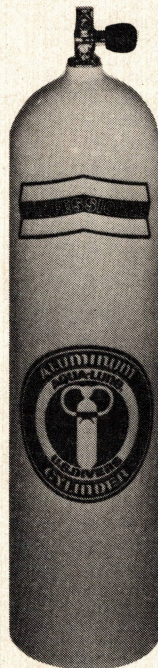
affairs, developing instructor training programs and materials, and special projects.

John is a native of the Midwest where he owned and operated a PADI Five Star training facility.

During the past eight years he has achieved the levels of master instructor, course director and various specialty ratings. Along with conducting several PADI ITC's, John has also hosted PADI instructor development seminars.

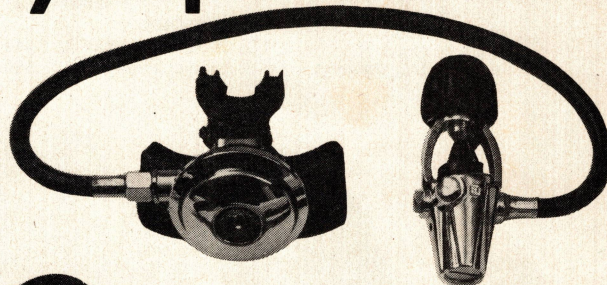
John's wife, Gloria, a PADI master instructor, is also heavily involved with activities. Her involvement has enhanced these programs immensely.

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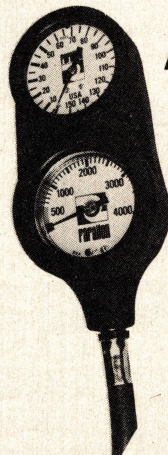
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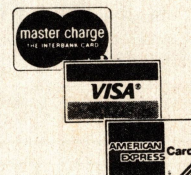
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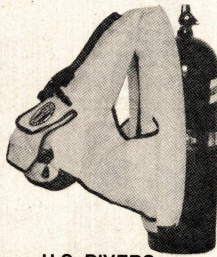
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SPECIAL NOTICE

D.E.M.A.

Famed underwater archaeologist ROBERT MARX will be at the Diving Equipment Manufacturers Assn. convention, Jan. 23-26, San Antonio, TX, to introduce and autograph his fantastic new book, *THE TREASURE OF Nuestra Señora de la Maravilla*. Come by Garrett Electronics Sea Hunter Booth 171. (See Garrett ad this magazine.)

CERTIFIED DIVERS

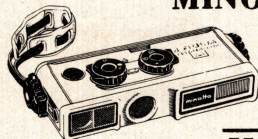
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SEA ROVERS '82

Sea Rovers '82, the Boston Sea Rovers' 28th Annual Underwater Clinic, will be held in Boston and Cambridge, MA on March 13 and 14. This year's edition of "the longest running underwater show on land" will feature an added attraction, Sunday seminars.

Highlights of the programs will be the 1981 *Andrea Doria* project with Peter



photo/Mark Schreyer

Peter Gimble and Elga Andersen

Gimble and Elga Andersen, and presentations by Jean-Michel Cousteau.

This year the daytime programs have been moved across the Charles River to the Science Center at Harvard University in Cambridge. Speakers will give presentations, in three adjacent rooms, from 10:00 am to 5:00 pm. The talks will include the *Andrea Doria* '81 technology,



Jean-Michel Cousteau

wreck diving, underwater archaeology, photography and marine biology. Tickets are \$6.

A large area of displays next to the program rooms will be open from 9:30 am to 5:30 pm. Dive equipment manufacturers will show their latest equipment along with dive tour agents, dive organizations and educational exhibits. A lunch hour intermission will be an added opportunity to visit the many booths. The display area is open to all without charge.

The evening program at the John Han-

cock Hall in Boston will be headlined by Jean-Michel Cousteau along with a special film from the 1981 *Andrea Doria* project. The program begins at 8 pm; tickets are \$9.

The meet-the-speakers party will be held immediately after the evening program, downstairs at the John Hancock Building's Dorothy Quincy Suite. The party, which is open to all, features an open bar and a band. Tickets are \$9.

The three Sunday seminars provide an opportunity for expanded material on special subjects beyond the 40 minute daytime program periods. They will be held at the Harvard University Science Center. Tickets to each seminar will be sold on Saturday and Sunday at the door.

Reduced price combinations are also available: day and night programs \$13; day, night and party combination \$19 — a \$5 savings. For tickets, send a check to Ray Oteri, P.O. Box 176, Hull, MA 02045.

For more information, contact Glen Reem, 30A Rockville Avenue, Lexington, MA 02173; (617) 861-7651.

UCSD PHOTO COURSES

University of California at San Diego Extension is offering a series of courses on marine photography during the winter and spring quarters this year. Winter course dates are: Basic U/W Photography — Jan. 5-Mar. 6; Tide Pool Photography — Jan. 6-Mar. 7; and Practical Marine Biology for Photographers — Jan. 7-Mar. 4. Courses planned for the spring (dates to be announced) are: Advanced U/W Photography; Marine Photo Specialties; Conceptual Marine Photography; and Post-Production Techniques.

The course instructors and advisors are professionals from the fields of marine biology and underwater photography (including Paul Tzimoulis of SKIN DIVER Magazine).

For more information contact: Marine Photography, UCSD Extension, X-001, University of California, San Diego, CA 92093; or phone (714) 452-2320.

DIVER/MEDIC TRAINING GUIDELINES

Charlie Vallance, head of the underwater technology department at Florida Institute of Technology, was recently selected as a subcommittee member to the Undersea Medical Society.

The diver/medic subcommittee met in New Orleans September 26 and established two levels of training for diver/medics. These programs are oriented toward commercial divers, and it is expected that most of them will ultimately receive training in one of these two programs.

According to the subcommittee chairman, Alfred A. Bove, M.D., Ph.D., the group is currently working on details of the training program, exams and recertification procedures.

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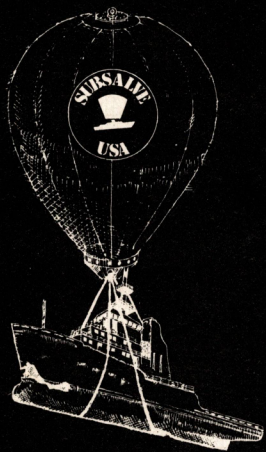
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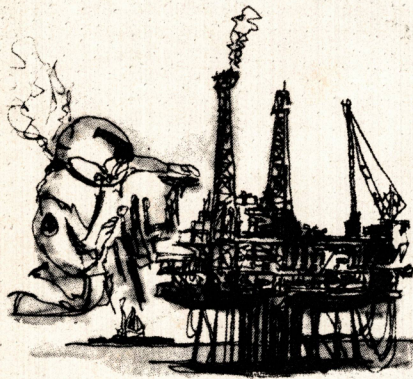
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104 SKIN DIVER JANUARY 1982

BRITISH COLUMBIA

(Continued from Page 65)

nestled itself in the space between the tank valve and the back of her head. It was impossible for her to extract it, and it was pretty comical watching her swim around with the octopus in its new found home. We let it go in the wreck and bid adieu to our little friend.

The four main areas from which we dived — Powell River, Campbell River, Telegraph Cove and Barkley Sound were incredibly diverse, each offering unique and indigenous marine life and a geog-



photo/Bob Abrams

raphy all its own. However, there is much more to see in British Columbia and an excellent book, well worth getting if you plan a trip there, is Betty Pratt-Johnson's *141 Dives in the Protected Waters of Washington and British Columbia*. Many dive shops carry the book, but if yours doesn't have it, contact the publisher: The Writing Works, Inc., 7438 S.E. 40th St., Mercer Island, Washington 98040. Another great little publication is Rick Arbo's *Tidepool & Reef, Marinelife Guide to the Pacific Northwest Coast*. Rick is a marine biologist and the book covers most of the invertebrate life found in these waters. The book is published by Hancock House Publishers Ltd., 10 Orwell St., North Vancouver, B.C., Canada V71 3K1.

An excellent overview of diving all of British Columbia, along with a listing of services and accommodations, can be obtained by sending \$1.00 to Dive B.C., B.C. Tourism Center, P.O. Box 94449, Richmond, British Columbia. Neil McDaniel put this together. After years of diving the province and surrounding waters, he probably has greater insight than anyone.

Sari and I had driven up to British Columbia from Los Angeles. We had a 1500 mile drive and were really looking forward to warm and sunny Southern California. Although we had had enough of the inclement weather, the incredible sights and the new friends far outweighed the climate. British Columbia has a lot to offer those divers who are looking for a change of pace, and those lensmen who really appreciate exciting macro and close-up photography. And, the American dollar is worth 20 percent more than the Canadian dollar, so your money goes a little farther, north of the border.

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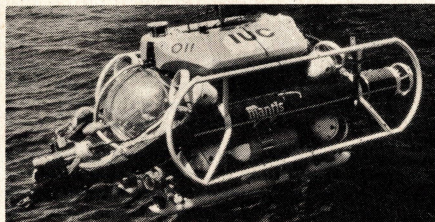
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MANTIS OFF CALIFORNIA

IUC has been awarded a contract to supply dive services to depths of 1800 feet on the Glomar Coral Sea drilling off-shore California. Operations started in



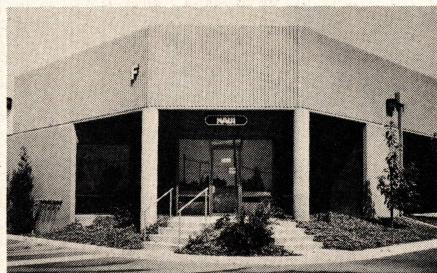
mid-November. IUC is supplying its *Mantis* (No. II), a one atmosphere, manned, tethered submersible rated to 2300 feet.

This is the first use of the *Mantis* off the California coast. IUC is presently operating *Mantis* systems in Indonesia and in the Gulf of Mexico.

NAUI MOVES

Headquarters for the National Association of Underwater Instructors (NAUI) has been moved to Montclair, CA. The Montclair site fills the needs and criteria established for an appropriate headquarters location, according to Marshall McNott, NAUI's executive director.

The new facility has potential for further expansion and is much closer for visi-



tors from Los Angeles or Orange County areas and outside areas served by the Los Angeles and Ontario airports.

The new address is: 4650 Arrow Highway, Suite F-1, P.O. Box 14650, Montclair, CA 91763. The telephone number is (714) 621-5801.

U/W PUMPKIN CARVING

The Aqua-Nut Divers club of Clinton, Indiana staged an underwater pumpkin carving contest in October. Prizes were awarded to the winners in five categories: best looking pumpkin; ugliest pumpkin; most original pumpkin; first to finish carving; and the closest estimate of how long it would take to "drown" a pumpkin.

Aqua-Nut Divers' goal is to provide each member with many new diving companions with a wide variety of schedules and interests. The club also provides safe, fun, monthly dive outings, complete with cookouts and door prizes.

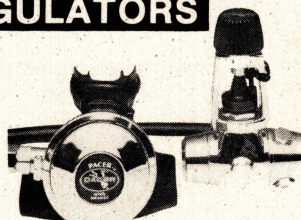
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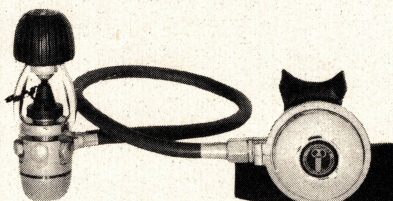
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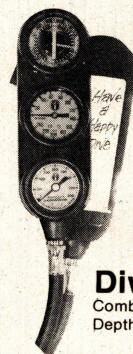
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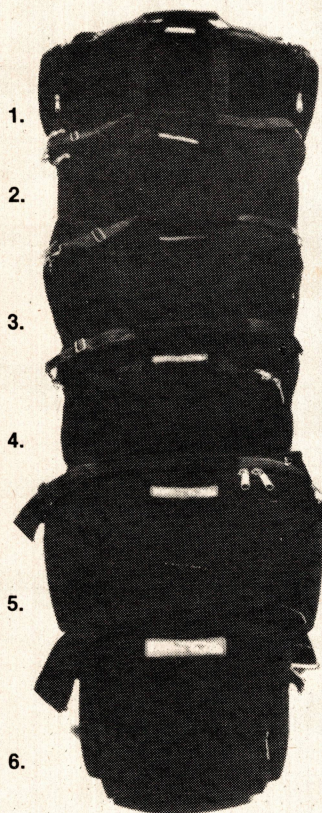


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YMCA COURSES

A program enabling the qualified diver to progress from YMCA scuba lifesaving and accident management certification to instructor is being offered at James Madison University in Virginia's Shenandoah Valley. The program includes a busy weekend for a YMCA SLAM Institute (Jan. 16-17) when the diver can obtain specialty certification in preventing and reacting to scuba emergencies and managing the scene of a scuba accident in coordination with other emergency agencies.

The next weekend, Jan. 23-24, allows a qualified diver to attend an institute for certification as a YMCA assistant instructor.

The following weekends, Jan. 30-31 and Feb. 6-7, will provide a YMCA scuba instructor's institute. Divers may attend all three institutes or only those in which they are particularly interested.

Pool and classroom work for the institutes will be held at James Madison University in Harrisonburg, VA. Land/Sea Passages is arranging the institutes as well as free accommodations.

All three institutes will involve full weekend schedules aimed at training excellent leaders in the prevention and handling of scuba accidents as well as training assistant instructors and instructors.

Contact Ken McCracken, YMCA Scuba Instructor, Land/Sea Passages, 14 E. Water St., Harrisonburg, VA 22801; or phone (703) 433-2177.

SEARCH FOUNDATION MOVE

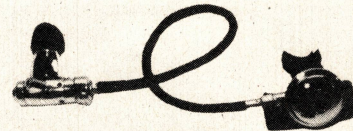
The Search and Rescue Charitable Foundation, SEARCH, has moved to a new location. The new address is 1300 S.E. 17th St., Suite 210, Fort Lauderdale, Florida 33316. Tax deductible donations for volunteer rescue units in the Bahamas and Caribbean should be sent to this new address.

DIVETRAVELGRAM

OceanQuest Tours & Travel, Inc., has developed and produced a computerized DiveTravelgram, which is being sent to 3000 dive shops, clubs and groups throughout the United States and Canada. This unique marketing service will enable OceanQuest to instantaneously communicate information about special travel packages, air discounts and rates, new destinations, commissions and overrides and important dive news. According to OceanQuest president, Frank T. Shane, "Our on-line computer capability and months of research and programming have enabled OceanQuest to reach nearly 100 percent of the active dive shops, clubs and group lead-

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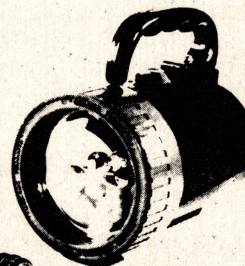
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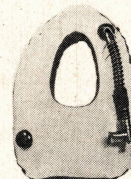
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ers. OceanQuest plans to send the computerized DiveTravelgram at least once a month.

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HENDERSON CANADA

Henderson Aquatics has appointed Greater Island Diving Services, Ltd. in Port Alberni, British Columbia as the distributor for its products in that area. John R. Stella, owner of Greater Island Diving Services, is a commercial diver and charter service operator with many years of diving experience.

For more information contact: Mr. John R. Stella, Greater Island Diving Services Ltd., Box 143, Port Alberni, British Columbia V9Y 7M6. ➤

ALLAN LIGHT

(Continued from Page 48)

ple. Rinse it off with soapy water and then clear fresh water. Don't leave it in the trunk of your car on hot days as excessive heat will cause the batteries to leak. If you remove the plexiglass lens,

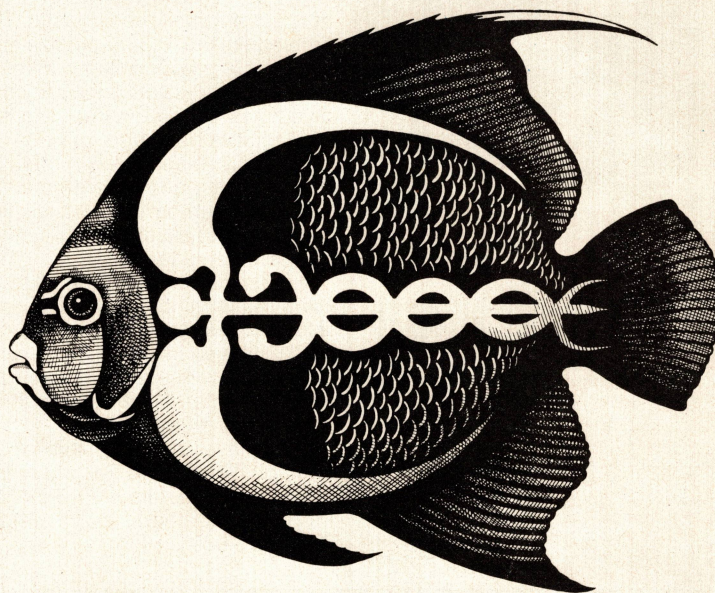


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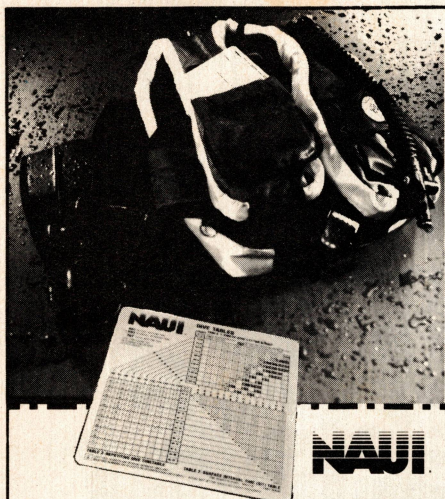
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UNDERWATER LUMBERJACKS

BY JOHN P. BAKER

While most southwest Missourians who cut down trees last winter did it for the firewood, at least two Ozarkians did it to prevent boat docks from being snagged or damaged on submerged timber. In the grips of a Midwest drought that began during the previous summer, commercial and private dock owners were continually moving their floating investments farther out into the lakes to keep pace with a steadily-retreating shoreline. The only problem was, as water levels dropped, objects on the bottom (mainly trees that were left standing when man-made reservoirs were filled) came closer to the surface.

When oak or cedar trees come between a boat dock and the buoyant support of water, something has to give. Rather than have supportive, plastic foam blocks torn apart or 55 gallon drums crumpled or punctured under the weight of a boat dock, many owners decided to have the trees removed. So, while others braved the winter weather to cut wood for the fireplace, Springfieldians, Don Peterson and Ron Plymate, dived in near-freezing lake water for up to five hours a day clearing out timber with a specially designed underwater chain saw.

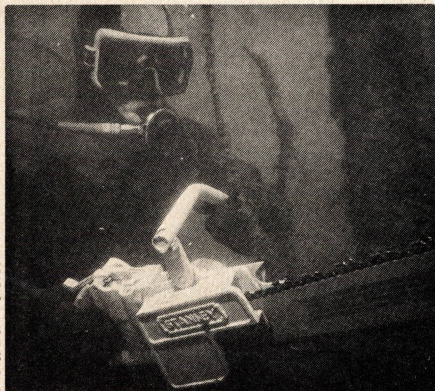
Peterson, 34, and Plymate, 32, used to cut the trees with a cross-cut saw that could take up to 20 minutes to bite its way through hardwood a foot in diameter. The hydraulic saw they now use can cut through the same size tree in about 20 seconds. With a two foot long blade, the saw is powered by a surface-based 16 horsepower engine.

The chain saw weighs about 14 pounds out of the water and according to the two men who earn a living in the dive industry, it is surprisingly easy to handle underwater and can also be used on the surface. "It only makes a slight buzz while it's running; the noise is nothing like a regular gas-powered chain saw," said Peterson, who is co-owner of a dive shop in Springfield. However, Plymate said, sawdust can create a problem underwater. "Instead of coming straight out the back as it would on the surface, it can have a tendency to pool in front of the saw. It can make it hard to see sometimes."

Working in a four state area, Plymate regularly cleans boat hulls with his hydraulic scrubbing machine. The power unit, which powers the saw as an accessory, weighs several hundred pounds

and Plymate keeps it on a boat for portability. Peterson, who spends much of his time with his retail business, also does some contract dive work and bought the chain saw to work with Plymate.

Most of their work has been done in Table Rock Lake, located in the Ozarks a few miles west of Branson and about 40 miles south of Springfield. Table Rock Dam was completed by the U.S. Army Corps of Engineers in 1958. It is one of several dams on the White River system, which once flowed freely in a



photo/Don Peterson

crescent beginning in northern Arkansas, meandering into Missouri and winding back into Arkansas again.

The resulting Table Rock Lake, at normal water level, has about 850 miles of shoreline. It attracts a large number of divers throughout the spring and summer, partly because of its accessibility, and partly because of the excellent visibility (by Midwest standards), commonly 20 feet or more. And though they may be a thorn in the side of dock owners at times of low water, the trunks and bare limbs of the submerged, hardwood forests that once covered the hillsides, create an interesting diversion for divers.

Numerous docks spot Table Rock's shoreline, providing slips for fishermen, divers and skiers who may leave their craft in the water year-round. Homeowners on the lake often have their own docks as well. Last winter, Peterson and Plymate bid on jobs (or charged \$100 per hour with a two hour minimum), to clear out the troublesome timber beneath them. "A lot of people just don't want to lay out that kind of money," Peterson said, "so usually they get together with other dock owners and we'll work on several docks at a time for the same job."

Peterson said they usually move the cut trees out into deeper water. "Underwater, they don't fall nearly as fast as they do on the surface, so you have plenty of time to get out of the way. Most of them we can pick up and carry." They don't use fins while cutting the trees. "We just weight ourselves down with lots of lead and walk on the bottom," Plymate said.

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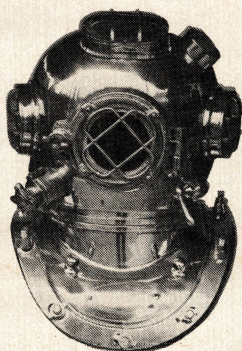
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MIDWEST MECCA Is A Pearl

BY ROGER A. KICKER AND
BOYD A. MEYERS

One mile south of the Illinois state line on U.S. 51, in South Beloit, lies one of the most frequently dived spots in the Midwest. Pearl Lake is noted by area divers for its splendid visibility, vast array of fish and scenic spots.

The lake itself covers 30 acres of sandy bottom and affords good visibility most of the year. It is not unusual to have 30-40 foot visibility (greater during ice diving months) which provides a good environment for underwater photography.

Pearl Lake was purchased by Donald Witte in 1961 and opened as a resort in June, 1963. Don's sons, Michael and Dean, help manage it.

Pearl Lake has an abundance of fish and a variety of underwater scenes. Located at various points throughout the lake are two trucks, two boats, a stretch of railroad tracks (a local fish hang-out), a school bus, and the newest addition, a twin engine Beechcraft airplane, with Canadian Air Force still visible on the fuselage. All the underwater sites are in less than 40 feet of water. Many are marked for easy location by the local search and recovery team.

Usually a full wetsuit is required when diving in Pearl Lake. The water temperature ranges from 70°F in shallow water to 35°F beneath the thermocline. The lake has an average depth of 36 feet and a maximum depth of 85 feet.

Pearl Lake has excellent night diving and ice diving opportunities and is often the scene of check-out dives from both local and Chicago area dive shops.

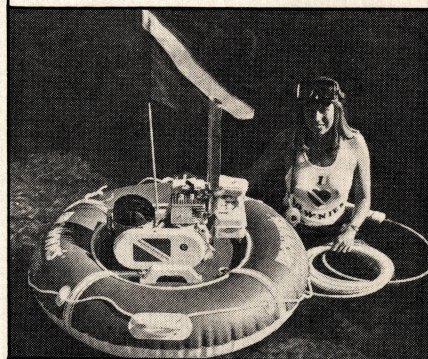
The lake also has a sandy beach (with marked shallow and deep ends), camping grounds and a supper club with food second to none in the area.

There are also three motels within a one mile radius of the lake. These are the Holiday Inn, located on U.S. 51 at U.S. 75; the Tollway Motel located one-half mile east from the Holiday Inn on U.S. 75; and the Beloit motel just south of Pearl Lake on U.S. 51.

The area is served by two excellent dive shops, both located a half hour drive away, in Rockford, IL. Petrie's Sports and Venture Forth supply the diver with excellent instruction, equipment and air. Pearl Lake also has its own air compressor for air fills and is planning to open a small accessory shop at the lake.

Pearl Lake has approximately one and one-half miles of shoreline, with picnic tables located at most dive spots. A nom-

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inal fee gives you the use of the lake from dawn to dusk. This includes picnicking if you wish.

The activities at Pearl Lake, whether they be fish feeding or just playing the driver of an underwater school bus, are well worth the trip. 

U/W LUMBERJACKS

(Continued from Page 109)

Using scuba with drysuits, they extend their down time by several hours in the water that dips into the low 40's (°F) during the winter. Most southwest Missouri winters are somewhat mild compared to more northern parts of the Midwest, but coves on some Ozarks lakes occasionally freeze over. "We just slip into long underwear, put on the suit, and we're set," Plymate said.

Plymate's hull scrubbing business keeps him traveling to lakes in Oklahoma, Kansas, Arkansas, and Missouri. In 1980 he did repair work on a submerged sewer pipeline in a Springfield lake, while Peterson's business had the inspection contract when the pipe was being laid.

The tree cutting business for Peterson and Plymate has slowed since drought-breaking rain brought the levels of many lakes up during the past spring and summer. However, they're not discouraged, because as most old-timers in the hills will tell you, droughts run in cycles. Like the saying, "One man's misery . . ." 

DIVING STATISTICS

The National Underwater Accident Data Center at the University of Rhode Island gathers information on all underwater fatalities involving U.S. citizens and prepares an annual report entitled: *United States Underwater Diving Fatality Statistics*. This report has proven to be an important document in the ongoing effort to improve safety underwater.

The report includes analysis of all types of U/W diving accidents — skin diving, scuba diving, surface supplied air, recreational, scientific, commercial, military, etc. It is sponsored by the Manned Undersea Science and Technology Office of the National Oceanic and Atmospheric Administration, the U.S. Coast Guard and the National Institute for Occupational Safety and Health.

The center is currently seeking information on accidents that occurred in 1980 and 1981. If you have such, contact the National Underwater Accident Center, University of Rhode Island, Kingston, RI 02881. Include your return address, the victim's name and age, the date and location of the accident and a brief description of it including whether it involved skin, scuba, commercial diving, etc.

Copies of the report can be obtained from: Scuba Safety, P.O. Box 68, Kingston, RI 02881. 

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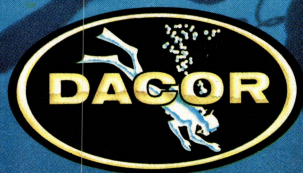
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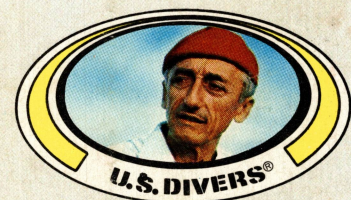
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